ARCHAEOLOGICAL INVESTIGATIONS AT SITES 45-OK-250 and 45-OK-4, CHIEF JOSEPH DAM PROJECT, WASHINGTON

by

Christian J. Miss

with
S. Neal Crozier, Stephanie Livingston,
Dorothy Sammons-Lohse and Nancy A. Stenholm

Principal Investigators

R.C. Dunnell 1978-1984
D.K. Grayson 1978-1981
M.E.W. Jaehnig 1981-1984
J.V.Jermann 1978-1981

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ABSTRACT

Site 45-OK-250 and 45-OK-4 are located on a narrow terrace at the foot of a steep slope on the right bank of Columbia River 70 to 350 m upstream from River Mile 578. The site lies in an Upper Sonoran life zone. In 1979 and 1980 the University of Washington excavated 347 m^3 of matrix volume for the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating pool level behind Chief Joseph Dam. Systematic random sampling using 1 x 1 x 0.1-m collection units in 1 x 1, 1 x 2, or 2 x 2 m cells disclosed three prehistoric occupations in overbank, colluvial and aeolian deposits. The first occupation is represented by diffuse cultural material and a few structured features found in overbank sand and silt deposits and in association with basal river gravel and alluvial fan deposits. The zone is dated by a single radiocarbon date, the age of the overlying zone and a small number of projectile points to pre-3500 B.P. It represents a mix of Hudnut and Kartar Phase elements. The second zone, dated from 3500 to 2000 B.P., by 17 radiocarbon dates, is contained in slope wash sediments with increasing aeolian modification toward the surface and locally variable colluvial contributions. It contains seven structures, six of them housepits. The zone represents year round village occupation supported by a broad spectrum hunting and gathering subsistence pattern attested by remains of deer, mountain sheep, salmon, and a variety of plant species. Identified botanical species of note include camas (Camassia) and sunflower (Helianthus). The zone demonstrates cultural historical continuity of the Hudnut with the earlier Kartar and subsequent Coyote Creek phases. The most recent zone is contained in wind modified slope wash and aeolian deposits. It is dated by projectile point styles and a single radiocarbon date to between 2000 B.P. and protohistoric times, placing it in the Coyote Creek Phase. Analysis indicates most of the cultural material is related to the early part of the phase representing transition from the Hudnut. Although the latest occupation contains no structures, the kinds of tools and resources used are similar to those of the Hudnut Phase.

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PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1976), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program identified of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

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This report is the result of the collaboration of many individuals and agencies. During the excavation and early reporting stages, Coprincipal Investigators were Drs. Robert C. Dunnell and Donald K. Grayson, both of the Department of Anthropology, University of Washington, and Dr. Jerry V. Jermann, Director of the Office of Public Archaeology, University of Washington. Dr. Manfred E.W. Jaehnig served as Project Supervisor during this stage of the work. Since the autumn of 1981, Dr. Jaehnig has served as Coprincipal Investigator with Dr. Dunnell.

Three Corps of Engineers staff members have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Officer's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Both Mr. Munsell and Mr. Salo have worked to assure the success of the project from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave generously of his time to guide the project through data collection and analysis. In his review of each report, he exercises that rare skill, an ability to criticize constructively.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the entire length of project. The Tribes' Business Council and its History and Archaeology Office have been invaluable. We owe special thanks to Andy Joseph, former representative from the Nespelem District on the Business Council, and to Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate federal and state agencies of the necessity of the investigation. They helped secure land and services for the project's field facilities as well as helping establish a program which trained local people (including many tribal members) as field excavators and laboratory technicians. Beyond this, their hospitality has made our stay in the project area a most pleasant one. In return, conscious of how much gratitude we wish to convey in a few brief words, we extend our sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph, in particular.

Site 45-OK-250/4 is located on land owned by Gilbert L. Johnson, trustee. We thank him for granting us permission to excavate the site.

As authors of this report, we take responsibility for its contents. What we have written here is only the final stage of a collaborative process which is analogous to the integrated community of people whose physical traces we

have studied. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, Coprincipal Investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs that were used to select data from each site. The designs provided a uniform context for studying prehistoric subsistence-settlement patterns in the project area. Excavations were supervised by Christian J. Miss.

S. Neal Crozier did the initial data summary for the stratigraphic analysis as well as the depositional unit analysis and the chemical and mechanical sort analyses. The laboratory staff did the technological and functional artifact analysis. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data.

The writing of the report itself is an interdisciplinary effort. Christian J. Miss wrote Chapters 1, 2, 3, and 7. As senior author, she also coordinated and integrated the contributions of the other authors. S. Neal Crozier and Julia Hammett provided the initial analysis for Chapter 2. Stephanie Livingston analyzed the faunal assemblage and wrote Chapter 4. Nancy Stenholm analyzed the botanical assemblage, and wrote Chapter 5. Dorothy Sammons-Lohse analyzed the features, and wrote Chapter 6.

Marc Hudson edited the text, Dawn Brislawn typed it and coordinated production. Melodie Tune and Bob Raded drafted the grahpics. Larry Bullis photographed the artifacts. Production of the camera ready copy was accomplished by Charlotte Beck and Philippa Colley under the direction of Sarah K. Campbell.

1. INTRODUCTION

Site 45-OK-250 is on the right bank of the Columbia River, 70 m (230 ft) upstream from River Mile (RM) 578 in the NE 1/4 of SW 1/4 of SE 1/4, Section 25, T31N, 29E, Willamette Meridian; U.T.M. Zone 11, N. 5,335,289, E. 341,534. Site 45-OK-4 is just southeast of 45-OK-250, 350 m (1,148 ft) upstream from RM 578 in the NE 1/4 of SE 1/4 SE 1/4 in the same section, township, and range as 45-OK-250, in U.T.M. Zone 11, N. 5,335,255, E. 341,847 (Figure 1-1). The sites are approximately 290-295 m (951-968 ft) above mean sea level (m.s.l.) and 2-7 m above the 1978 operating pool level of Rufus Woods Lake. Before impoundment of the reservoir the sites were 17 to 22 m above the Columbia River. Site 45-OK-250 originally was part of Osborne's larger site 45-OK-4 (Osborne et al. 1952). The sites were excavated separately but are considered together in this report.

The sites are on the same terrace remnant at the foot of a steep slope which forms the northern boundary rising to the 1,000 ft terrace (Figure 1-2). The eastern and western site boundaries were assigned on the basis of land forms and deposition. The western boundary of 45-OK-250 was drawn where the deposits bearing cultural material thinned out, exposing sterile basal deposits. A second drainage bisects 45-OK-250 and a third eroded area was arbitrarily selected as the eastern boundary separating it from 45-OK-4 (Figure 1-3). Site 45-OK-4 is similarly divided internally by drainages (Figure 1-4). A narrow terrace remnant to the east with a steeply sloping surface (Area C) was originally included in 45-OK-4. No excavations were conducted here and the eastern site boundary was regarded as the drainage occurring at the east end of Area B. Both sites are bounded on the south by Rufus Woods Lake.

Steep granitic cliffs cut by several seasonal drainages rise north of the sites and the 1000 ft terrace. Within four km to the west are Hopkins, Lee and Weber Canyons (Figure 1-2). To the east the perennial Coyote Creek provides access to the Okanogan Highlands above the granitic cliff. Deadman's Eddy, a likely fishery location, was about 150 m downriver from 45-OK-250 (note location of mid-river erratics, Figure 2-1). Across the river to the south the land rises steeply to the top of the basalt escarpments and the Columbia Plateau. Plate 1-1 and 1-2 show overviews of the site and nearby landforms.

The Columbia Plateau has a semiarid climate characterized by hot summers and moderate winters (Daubenmire 1970:6). In summer, clear skies prevail; temperatures are warm during the day and cool at night. In winter and early spring, storm fronts from the north Pacific bring overcast skies. The marine air masses, however, lose most of their moisture in crossing the coastal

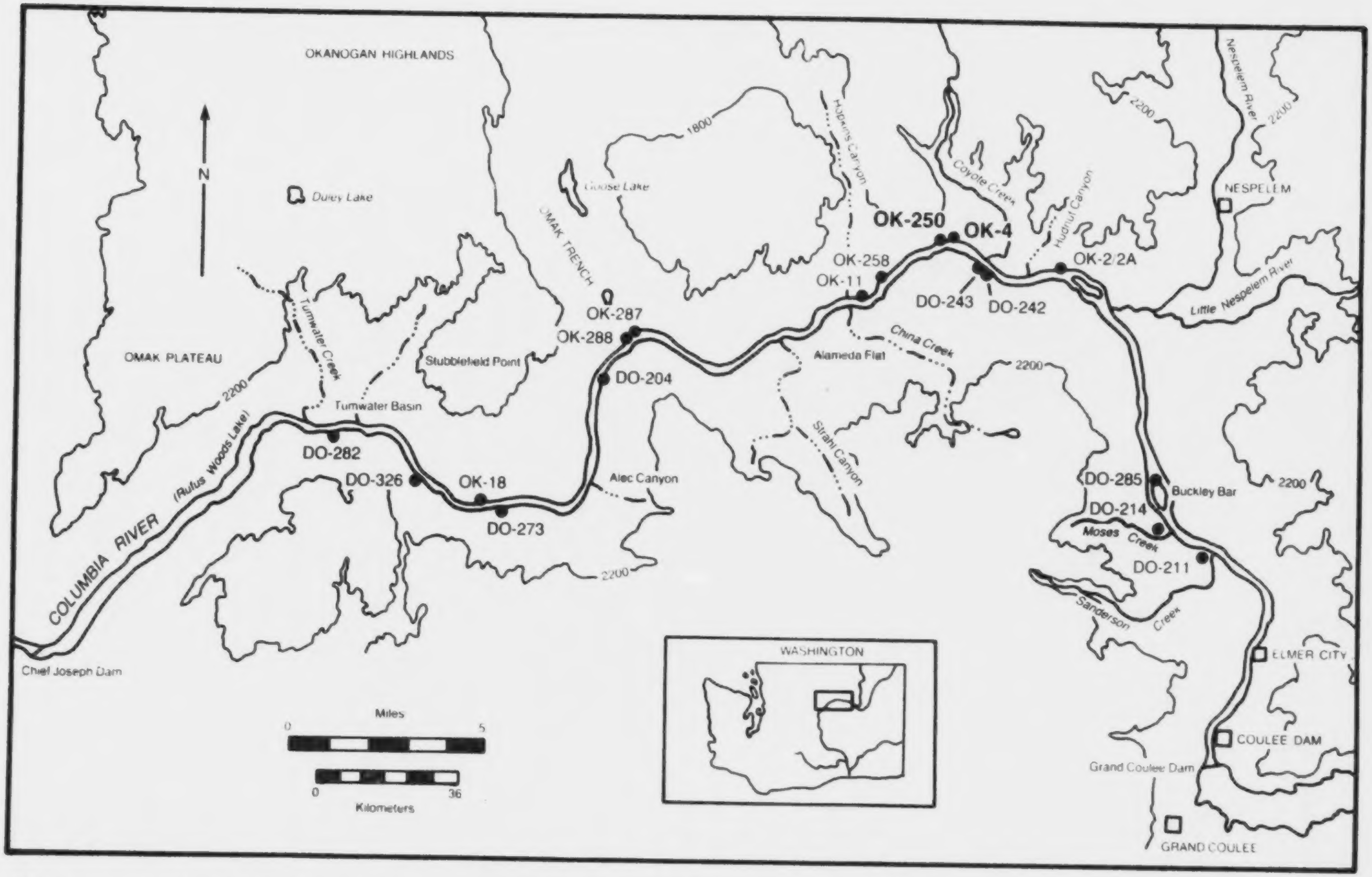

OKANOGAN HIGHLANDS
N
Duley Lake
OMAK PLATEAU
2200
Tumwater Creek
Tumwater Basin
Stubblefield Point
OMAK TRENCH
Goose Lake
1800
Hopkins Canyon
OK-250
OK-4
Coyote Creek
Hudnut Canyon
OK-2/2A
2200
NESPELEM
Nespelem River
2200
Little Nespelem River
OK-258
OK-11
DO-243
DO-242
OK-287
OK-288
DO-204
Alameda Flat
China Creek
2200
Strahl Canyon
DO-282
DO-326
OK-18
DO-273
Alec Canyon
2200
COLUMBIA RIVER
(Rufus Woods Lake)
Chief Joseph Dam
DO-285
Buckley Bar
DO-214
Moses Creek
DO-211
Sanderson Creek
2200
ELMER CITY
COULEE DAM
Grand Coulee Dam
GRAND COULEE
WASHINGTON
Miles
0
5
Kilometers
0
36

Figure 1-1. Map of project area showing location of 45-OK-250 and 45-OK-4.

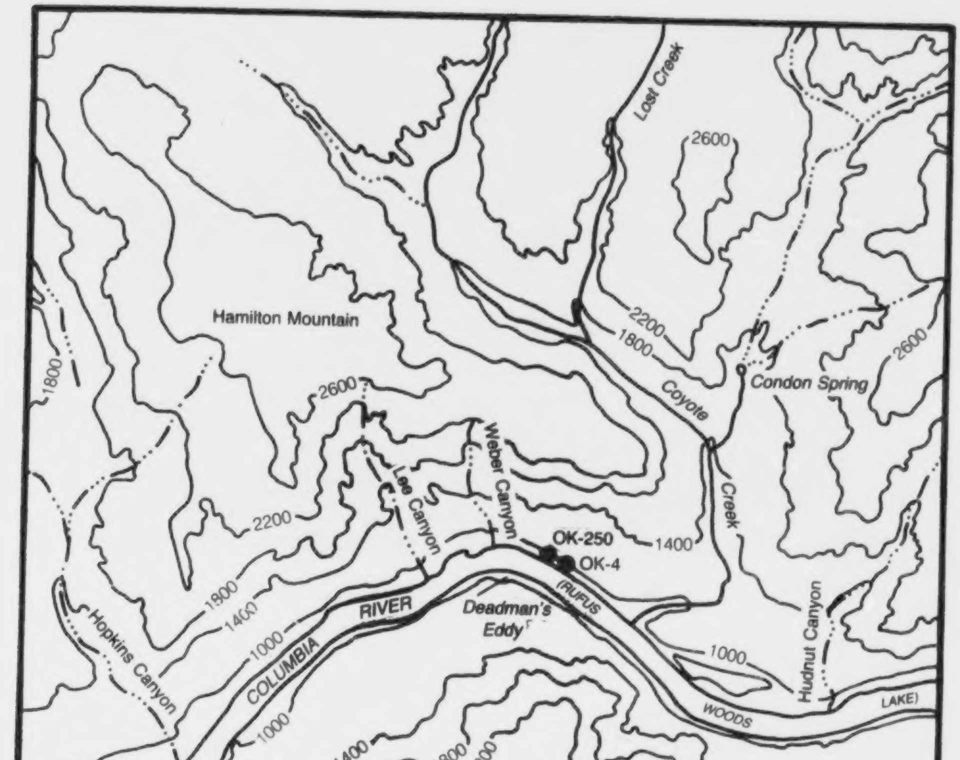

Lost Creek
2600
Hamilton Mountain
2200
1800
Coyote
Condon Spring
2600
1800
2600
Weber Canyon
Lee Canyon
2200
OK-250
OK-4
1400
Creek
1800
1400
1000
RIVER
Deadman's Eddy
(RUFUS
Hopkins Canyon
COLUMBIA
1000
Hudnut Canyon
WOODS
LAKE)
1000
1400
1800
2200
China
Creek
Twin Springs Canyon
Black Lake
0
1
Mile
N
China Creek
Rock Lake

Figure 1-2. Site vicinity map, 45-OK-250 and 45-OK-4.

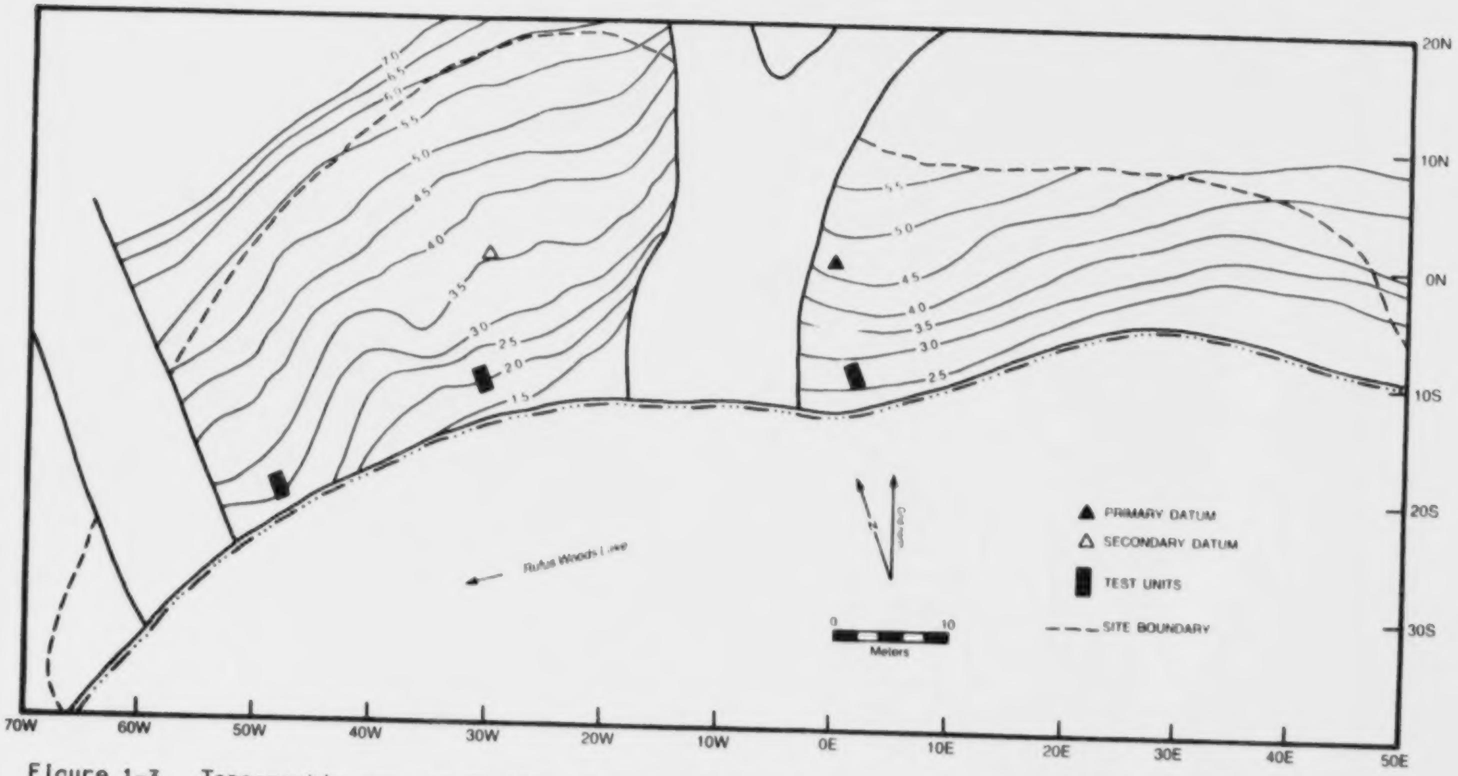

70
65
60
55
50
45
40
35
30
25
20
15
55
50
45
40
35
30
25
Rufus Woods Lake
Grid north
N
0
10
Meters
PRIMARY DATUM
SECONDARY DATUM
TEST UNITS
SITE BOUNDARY
20N
10N
0N
10S
20S
30S
70W
60W
50W
40W
30W
20W
10W
0E
10E
20E
30E
40E
50E

Figure 1-3. Topographic map, 45-OK-250. Elevations in meters relative to primary site datum.

Plate 1-1. Site 45-OK-250: view to the west (downriver).

Plate 1-2. Site 45-OK-4: view to the west (downriver).

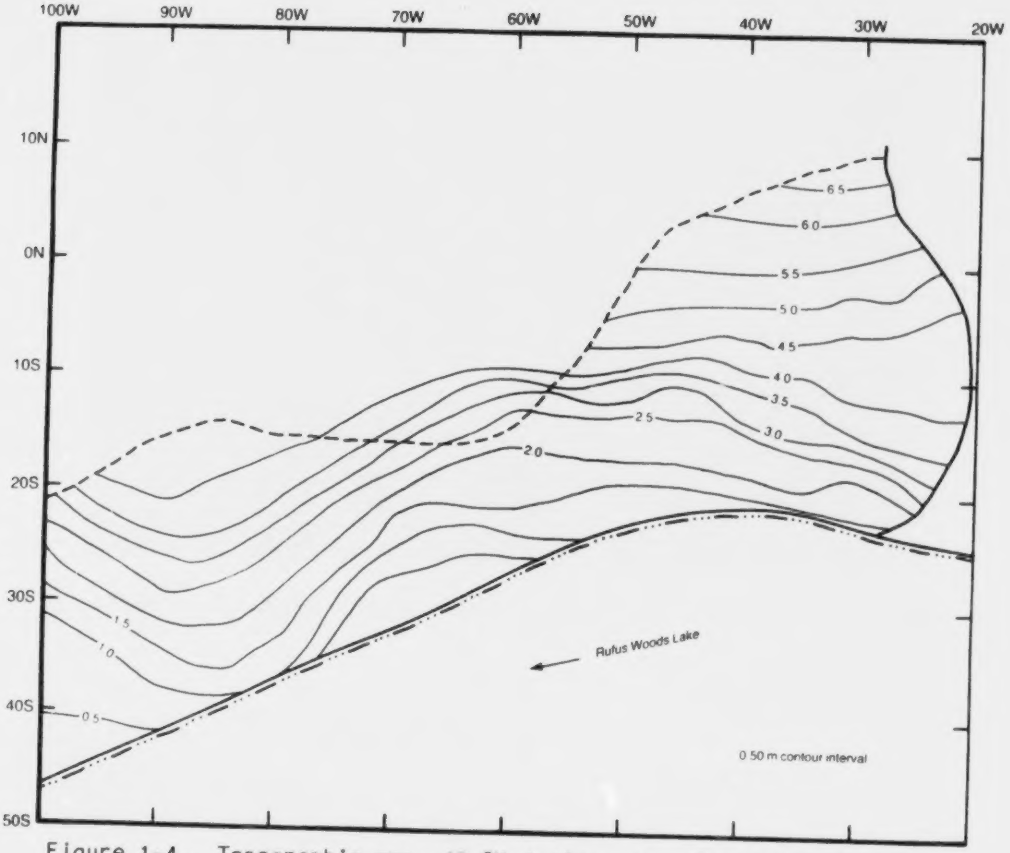

100W
90W
80W
70W
60W
50W
40W
30W
20W
10N
0N
10S
20S
30S
40S
50S
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
Rufus Woods Lake
0.50 m contour interval

Figure 1-4. Topographic map, 45-OK-4 (Area 4). Elevations in meters relative to primary site datum, 45-OK-250.

mountain ranges so that overall precipitation in the project area is slight. Winter temperatures are mild, moderated by marine air flows.

A sagebrush-grass association (Artemisia tridentata-Agropyron) (Daubenmire 1970), which is typical of the Upper Sonoran life zone (Piper 1906), dominates the vegetation in the site area. Scattered sagebrush and a dense understory of grasses (Agropyron spicatum dominant), grow on the sites (Plate 1-1). Cheatgrass (Bromus tectorum) and thistles (Salsola kali and Cirsium sp.) were introduced in historic times. A more mesic association including roses (Rosa sp.), serviceberry (Amelanchier sp.), horsetail (Equisetum spp.), tule (Scirpus acutus), and sedges (Carex spp.) grows in nearby drainages. Ponderosa pine are also found in nearby drainages and along the river's course with broadleaf trees and shrubs.

Across the river, Artemisia rigida replaces big sagebrush in areas of thinner, rocky soils. Bitterbrush (Purshia tridentata) and isolated pines with an understory of grasses, grow along the steep draws draining the slopes

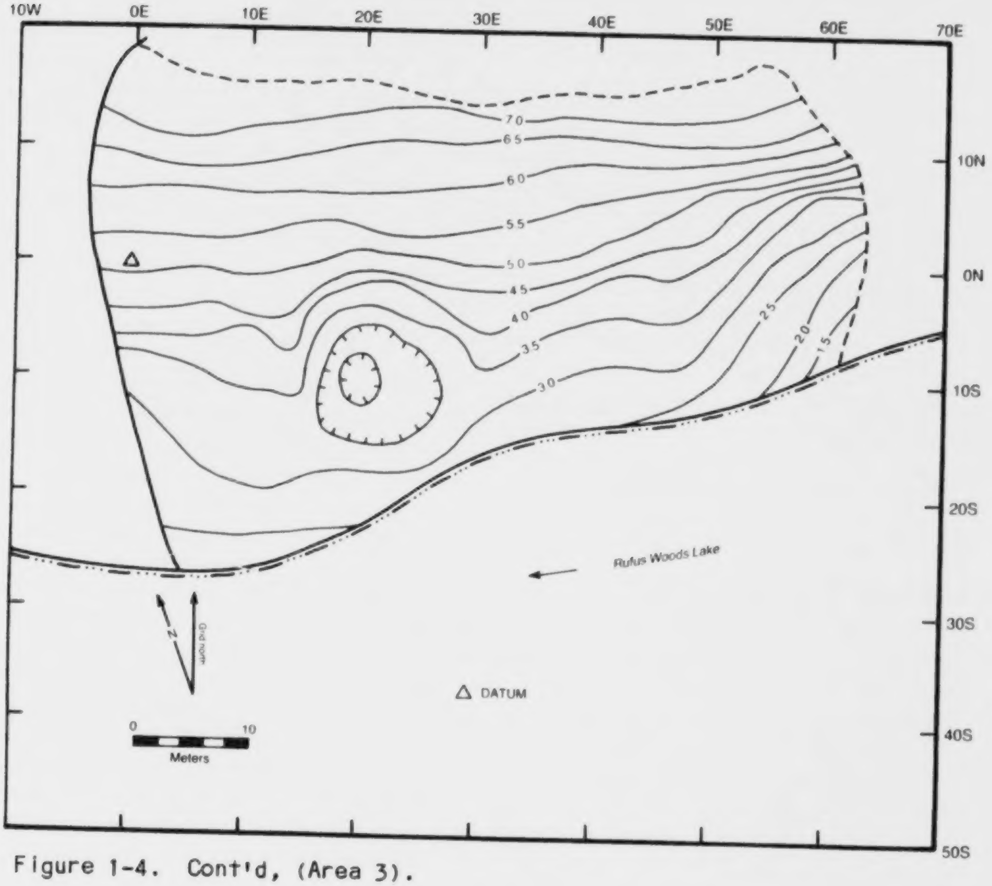

10W
0E
10E
20E
30E
40E
50E
60E
70E
10N
0N
10S
20S
30S
40S
50S
70
65
60
55
50
45
40
35
30
25
20
15
Rufus Woods Lake
N
Grid north
DATUM
0
10
Meters

Figure 1-4. Cont'd, (Area 3).

and terraces. Beyond the canyon rim, scattered pines give way to sagebrush covered uplands dotted with small lakes and springs.

INVESTIGATIONS AT 45-OK-250 AND 45-OK-4

Testing at 45-OK-4 in 1950 (Osborne et al. 1952) consisted of excavations of three trenches, three 3 x 5-ft units and two roadcut profiles (Figure 1-5). The two trenches excavated in a surface depression designated Housepit 1 showed no evidence of a structure or "occupation layer". The two 3 x 5-ft units excavated in Housepit 2 apparently encountered charcoal-stained strata. However, evidence of rims or other structural features is not apparent in the field profiles. The trench in Housepit 3 encountered a thick charcoal-stained matrix. Records from the remaining test unit and roadcut profiles show layers of shell and charcoal-stained matrix. Osborne evaluated the cultural deposits as possibly representing an extensive period of occupation but hesitated to make chronological estimates on the basis of the few artifacts recovered. He

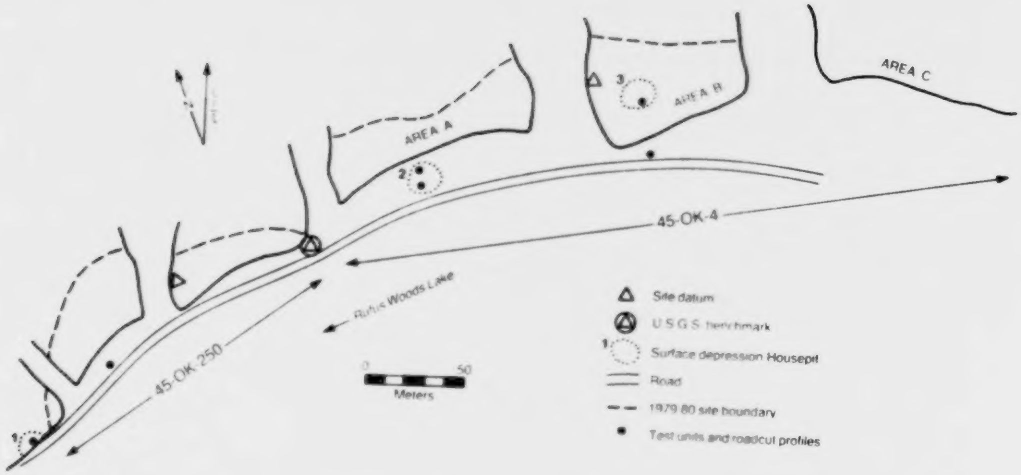


Figure 1-5. Test excavations, 1950, 45-OK-250 and 45-OK-4.

suggested that they probably represented recent site use based on the nature of the deposition which was interpreted as being quite rapid (Osborne et al. 1952:365). In 1978, excavation of three 1 x 2 m test units, several shovel tests and an unsystematic collection of beach lag deposits at 45-OK-250 suggested at least three components at the site: a lower, undated component characterized by low lithic, FMR and bone densities; a middle component with high densities of cultural material dated to 3450-2550 B.P. by projectile point styles and a radiocarbon date of 2441±240 B.P.; and an upper component again with low densities of cultural material relatively dated to about 400 B.P. None of the components appeared to represent occupations associated with structures. Site 45-OK-250 offered the opportunity to explore several temporally distinct components dating from prior to 3500 B.P. to the late prehistoric. The lack of evidence of subsurface dwellings led us to expect information about structure and content which might represent the special purpose sites described in regional ethnographies.

Site 45-OK-4 retained Osborne's Housepit 3 and possibly portions of Housepit 2, whose boundaries were uncertain. The presence of housepits and the few projectile points recovered suggested the site dated to at least 2000 B.P. (Osborne et al. 1952:365, Figure 110). Because test data already were available, no test excavations were undertaken at the site in 1977-78. Excavations were expected to provide information about activities and structures associated with a village site.

The sites also were selected for excavation because of their location among a cluster of sites in the east-center of the project area. The cluster begins at the downriver, or western end at the downriver or western end 45-OK-11, one of the oldest sites in the project area, and 45-OK-2/2A, a site occupied in the early historic period is at the eastern end (Figure 1-1). Also both 45-OK-450 and 45-OK-4 would be partly flooded and then severely eroded by the new elevation of the operating pool level.

EXCAVATIONS AT 45-OK-250

Probabilistic sampling at 45-OK-250 was conducted within a stratified unaligned systematic design. Sampling strata were created by dividing the site into 29 sets of grid units, each composed of 25 2 x 2 m units arranged in squares. Each 2 x 2 m unit within a stratum was designated by a Cartesian coordinate with a value of 1 to 5 assigned to points on the x and y axes. Beginning with the first stratum, two coordinates for the first unit were selected randomly. In the horizontal tier, the other three first order sample units were found by holding the original x coordinate constant and randomly choosing new y coordinates for the other strata. An identical procedure was used to determine the vertical tier units except the y coordinate was held constant and the x randomly varied. Following the selection of first order units, the same procedure was used to develop the second and third order units. The selected random units are shown in Figure 1-6.

Excavation of both first and second stage units was completed wherever topographically possible. Several units in the eroded drainage and beyond the cutbank were not excavated. Most of the sample units were 1 x 2 m. As excavation proceeded, it became apparent that the central portion of the site contained the most abundant and complex cultural deposits. Consequently, several of the units were expanded to 2 x 2 m and a number of third stage units were dug. In all, 104 m^2 or 5.0% of the approximately 2,100 m^2 site surface area was sampled by random units.

An additional 24 units, encompassing a surface area of 84 m^2, were excavated in the central area of the site to investigate cultural concentrations representing one, and possibly two buried structures. The result was excavation of 75-80% of Housepit 1, identification of concentrated debris layers at the south end of the 28W trench, and sets of continuous stratigraphic profiles that aided in correlation of contemporary surfaces. Further stratigraphic and material distribution analysis of the trench north of Housepit 1 suggests the edge of a second structure was encountered. Figure 1-7 shows the excavated random and non-random units and the associated structures.

A total volume of 373.4 m^3 was excavated at site 45-OK-250 from July to November during the 1979 field season. The crew consisted of from 9 to 13 excavators under the direction of a field supervisor. Cultural material recovered included 17,792 lithic artifacts, 400 non-lithic artifacts, 258,168 bones and bone fragments, 81,373 shells and 7,294 FMR. Samples were collected for sediment and botanical analysis and carbon samples yielded eight radiocarbon dates between 2800 and 4500 B.P.

EXCAVATIONS AT 45-OK-4

The sampling plan for 45-OK-4 selected random units by two different methods based on the separation of the site surface into non-housepit and housepit sampling strata. The non-housepit strata were defined for 2800 m^2 of the site and unit selection proceeded in the same manner as at 45-OK-250.

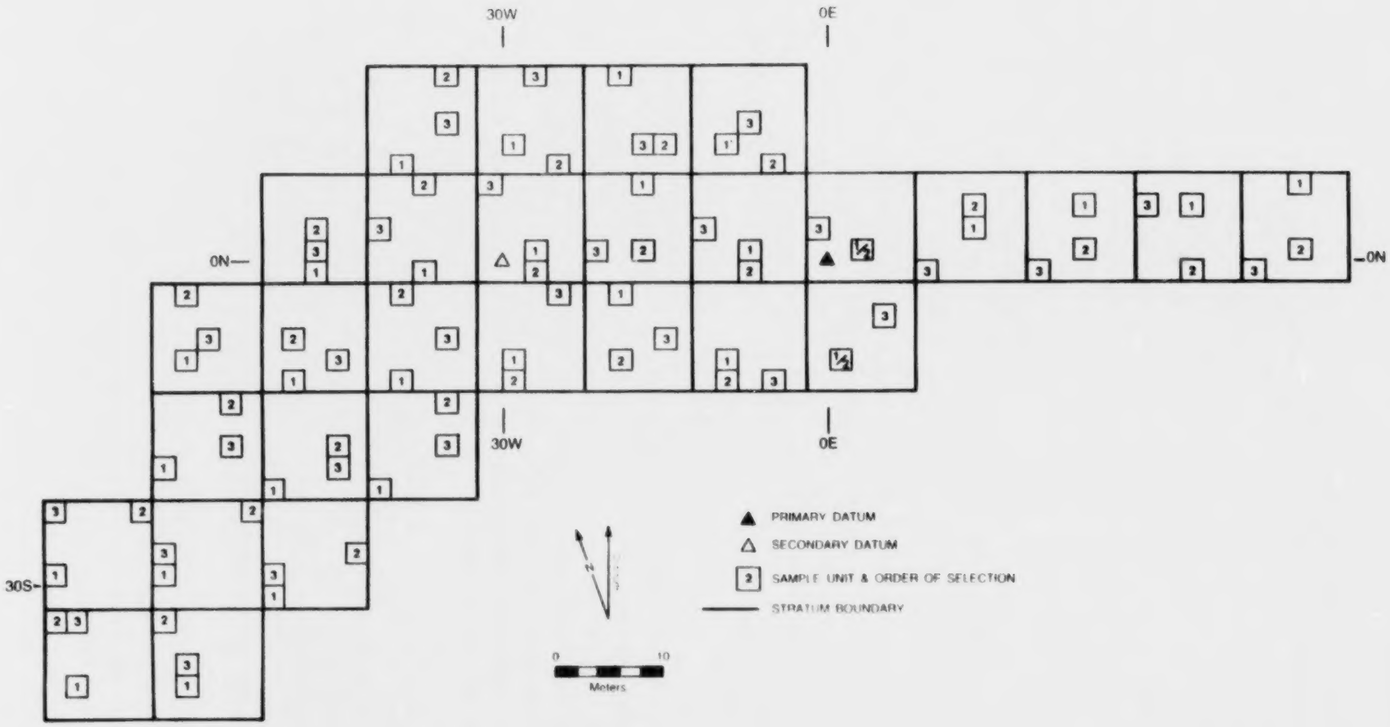

30W
0E
0N
30S
30W
0E
0N
PRIMARY DATUM
SECONDARY DATUM
SAMPLE UNIT & ORDER OF SELECTION
STRATUM BOUNDARY
N
0
10
Meters

Figure 1-6. Random sampling design, 45-OK-250.

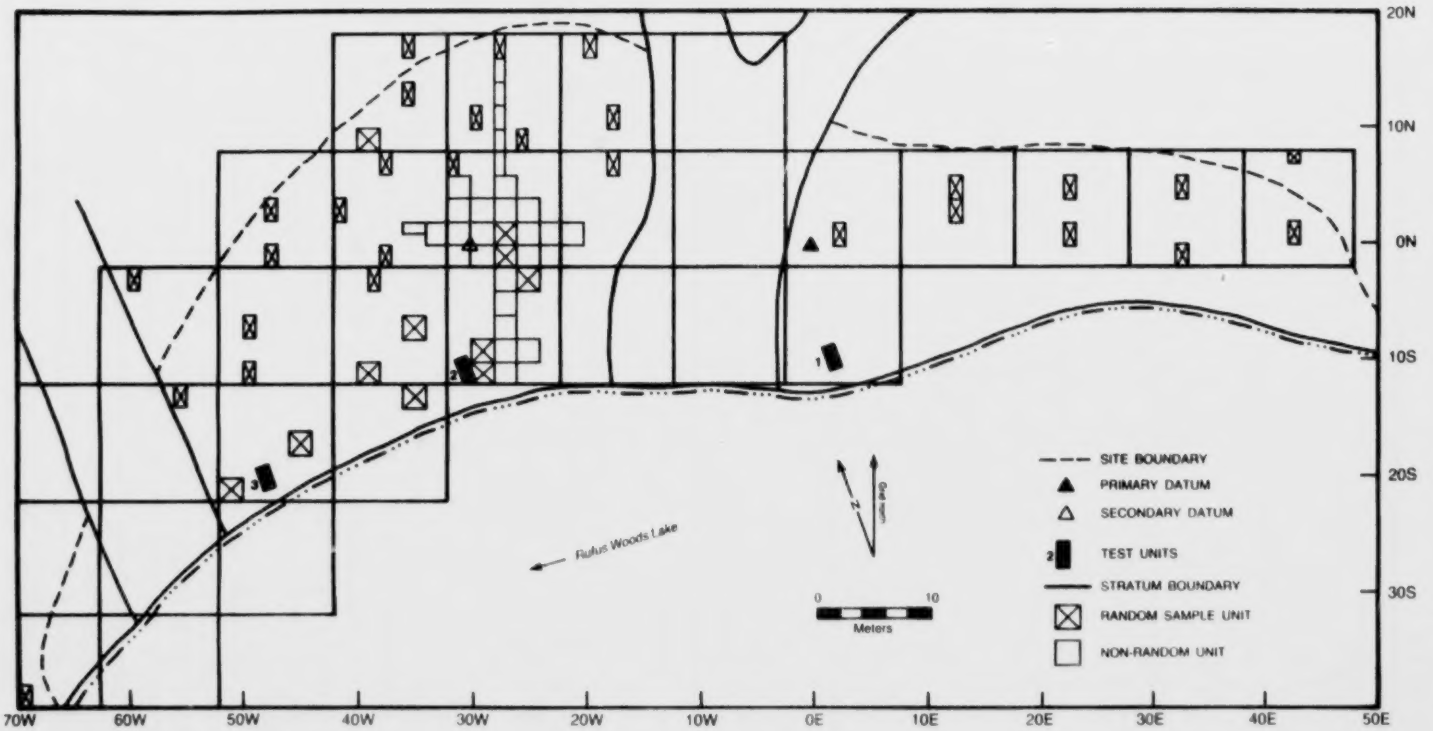

20N
10N
0N
10S
20S
30S
70W
60W
50W
40W
30W
20W
10W
0E
10E
20E
30E
40E
50E
1
2
3
Rufus Woods Lake
Grid north
N
0
10
Meters
SITE BOUNDARY
PRIMARY DATUM
SECONDARY DATUM
TEST UNITS
STRATUM BOUNDARY
RANDOM SAMPLE UNIT
NON-RANDOM UNIT

Figure 1-7. Excavated units, 45-OK-250.

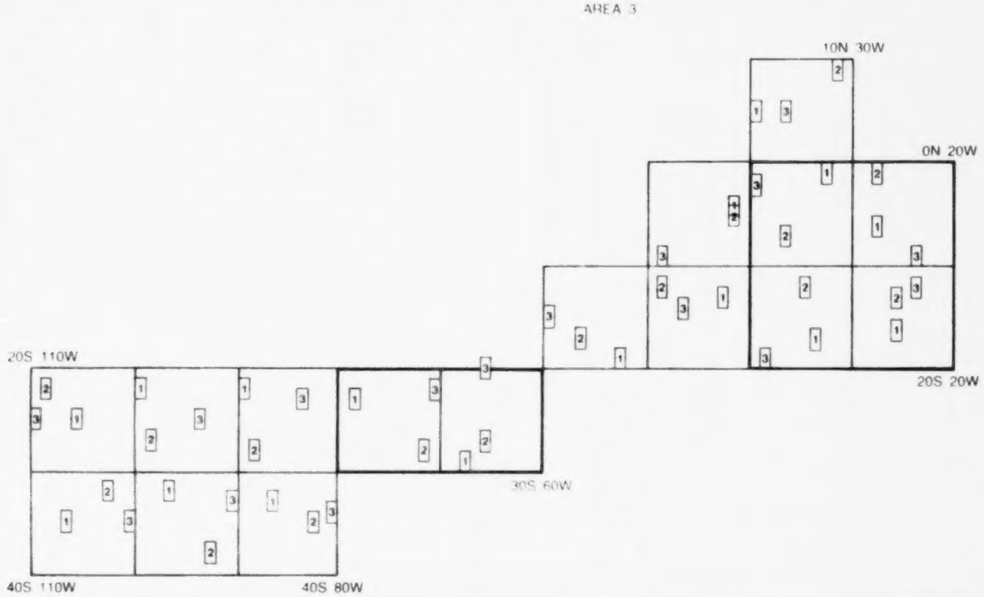


Figure 1-8. Random sampling design, 45-OK-4 (Area 4).

Housepit sampling strata were defined for four areas at the site including 1000 m^2 of the site surface. One of the areas includes Osborne's Housepit 3; another is the possible periphery of Housepit 2. The other two areas were designated as containing structures by later investigators on the basis of surface topography. Each proposed housepit area was divided into 10 x 10 m sampling strata from which 3 1 x 2 m units were chosen from each using a random numbers table. The non-housepit and housepit sampling strata and selected random units are shown in Figure 1-8. Note that the housepits have been renumbered independently of the 1950 investigations.

Excavation of two sample units from each non-housepit stratum was completed except where topography or other circumstances prevented. Strata between 110W and 100W showed evidence of an old road bed on the north. The remaining surface was eroded with only a few centimeters of deposition remaining on alluvial cobble deposits. Several random units on the northern edge of the site also were not excavated because they were on the steep, rocky slope leading to the 1000 ft terrace. Excavation of Area C was not conducted because the terrace remnant was almost completely eroded. Twenty-eight 1 x 2-m units were excavated from the non-housepit strata representing 56 m^2 or 2.0% of the non-structure surface area. Additional structure rims were identified in two of these units, 1S30E and 4N48E.

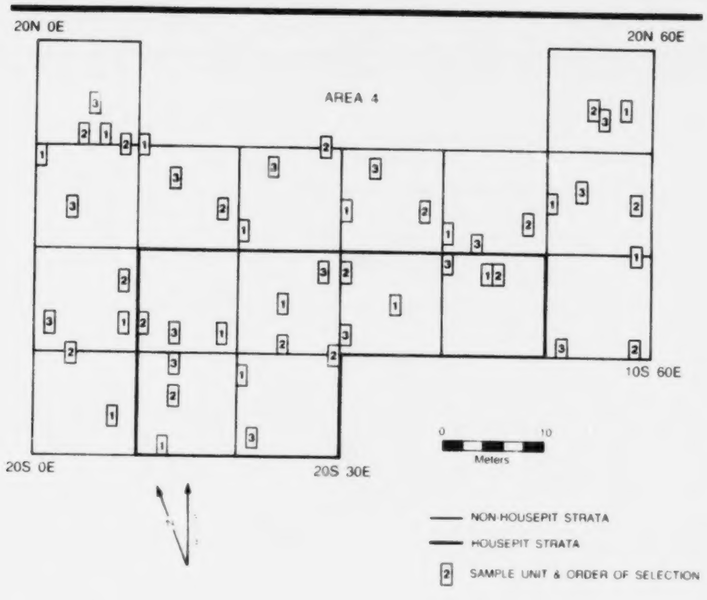


Figure 1-8. Cont'd, (Area 3).

Two units were excavated in each of the housepit strata except for two strata where a single 1 x 2-m unit was excavated. Twenty 1 x 2 m^2 and two 2 x 2-m units were excavated within the 12 housepit strata, representing 48 m^2 or 4.8% of the surface area. Random units in the Housepit 1, 3 and 4 sampling strata failed to confirm the presence of structures.

Additional non-random units were excavated to further identify and explore cultural deposits. Two 1 x 2-m units adjacent to 14S60W identified a small structure. Unit 6S40E was excavated in what should have been the center of Housepit 1. The unit revealed several occupation levels, but did not identify any structural features.

In the Housepit 2 locality, Osborne's trench was re-excavated. Stratigraphic profiles of the trench and evidence from the random units suggested complex cultural deposits, including at least two floors. A number of units were placed within the depression to provide more coverage of floor deposits and to stratigraphically link several of the random units.

The final focus of efforts at the site was in an area west of Housepit 2. Excavation of random units had encountered several dense layers of cultural debris initially thought to represent exterior activities of the Housepit 2 occupants. Excavation of additional units showed the area contained another buried structure (Housepit 5). Figure 1-9 shows excavated random and non-random units and approximate locations of buried structures.

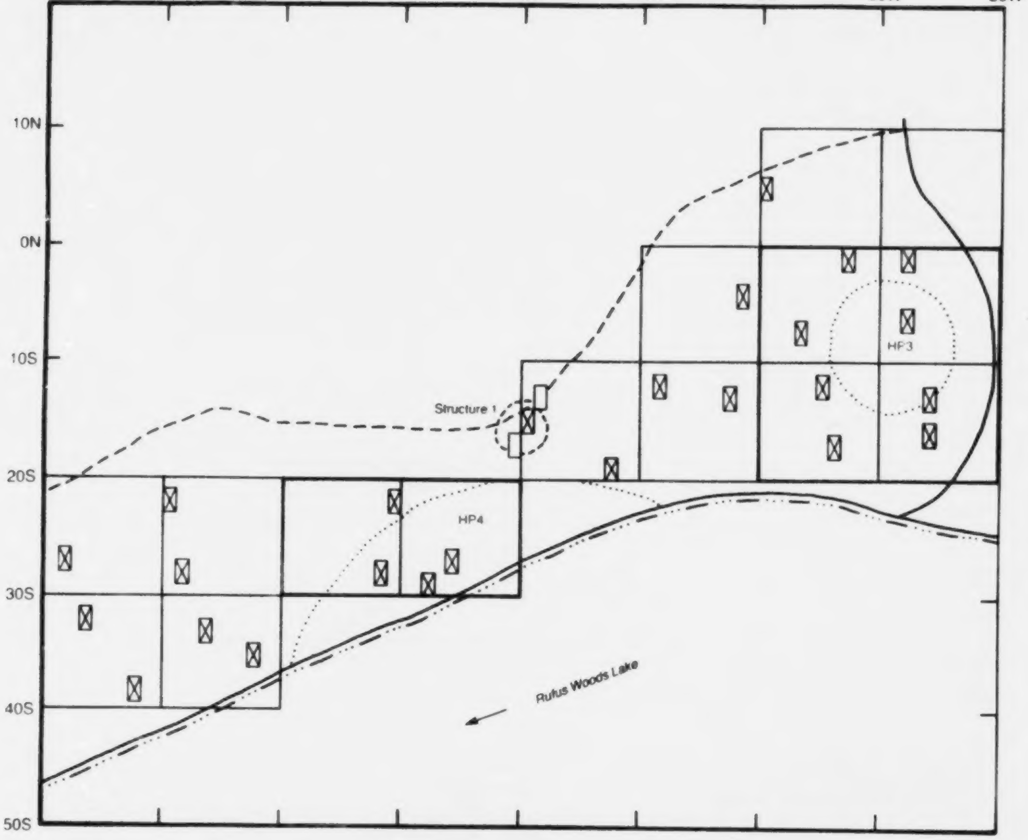

100W
90W
80W
70W
60W
50W
40W
30W
20W
10N
0N
10S
20S
30S
40S
50S
Structure 1
HP3
HP4
Rufus Woods Lake

Figure 1-9. Excavated units, 45-OK-4 (Area 3).

A volume of 243.6 m^3 was excavated at 45-OK-4 from November 1979 through February 1980. The crew consisted of 9 to 12 excavators under the direction of a field superivsor. A volume of 243.6 m^3 was excavated at 45-OK-4. Cultural material recovered included 18,606 lithic artifacts, 93 non-lithic artifacts, 207,790 bones and bone fragments, 28,403 shells and 6,794 FMR. Samples for sediment and botanical analysis were collected and carbon samples yielded 10 radiocarbon dates from the last 3,700 years.

REPORT FORMAT

The subsequent chapters present the results of analyses of the cultural material from 45-OK-250 and 45-OK-4. Time limitations have dictated that we combine the presentation of this data. The analytic units have been designed to compare the two major components of each site, those containing structures,

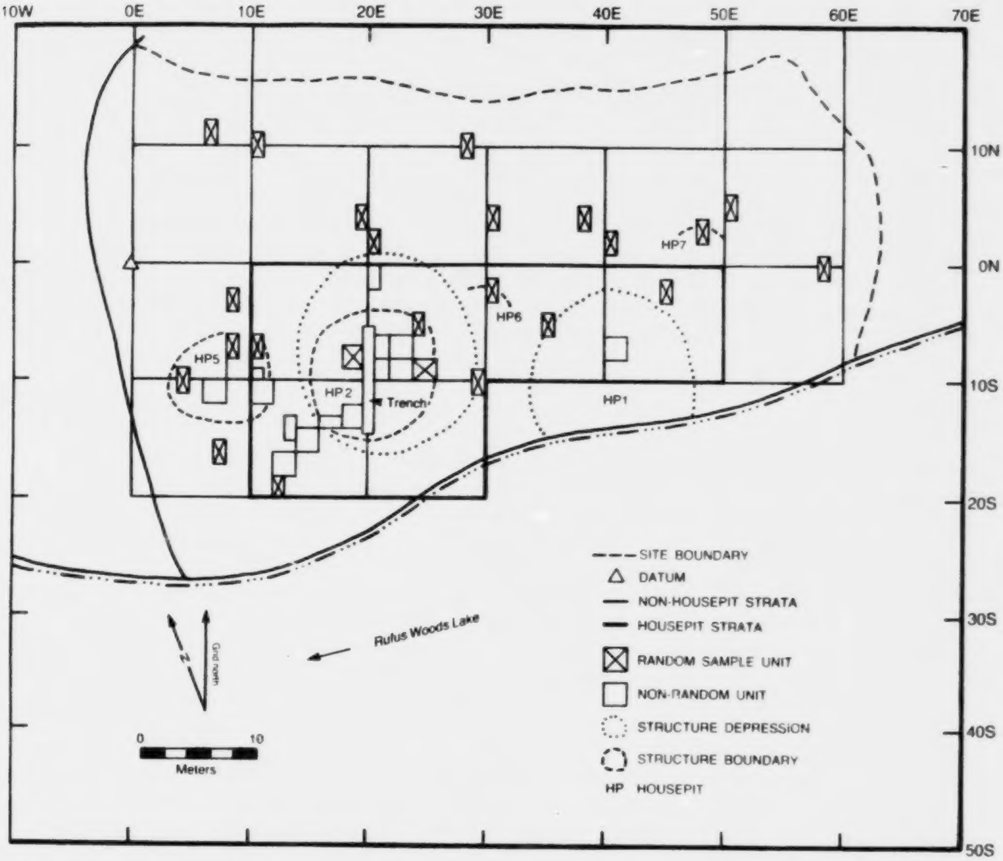

10W
0E
10E
20E
30E
40E
50E
60E
70E
10N
0N
10S
20S
30S
40S
50S
HP5
HP2
Trench
HP6
HP1
HP7
Rufus Woods Lake
N
Grid north
0
10
Meters
SITE BOUNDARY
DATUM
NON-HOUSEPIT STRATA
HOUSEPIT STRATA
RANDOM SAMPLE UNIT
NON-RANDOM UNIT
STRUCTURE DEPRESSION
STRUCTURE BOUNDARY
HP HOUSEPIT

Figure 1-9. Cont'd, (Area 3).

and to allow description of the components as representative of Hudnut Phase occupations. Descriptive detail is limited by the level of stratigraphic analysis as discussed in Chapter 2 and by the use of an abbreviated lithic artifact analysis. Data from each site is presented in a generalized intersite scheme in the chapters and by independent site zones in chapter appendices. Chapter 2 discusses the natural and cultural stratigraphy at each site and the basis for combined analysis. Chapters 3 and 4 discuss the artifact and faunal analyses. Chapter 5 presents the results of the analyses of botanical samples from 45-OK-250; samples collected from 45-OK-4 were not analyzed. Chapter 6 examines cultural features and the final chapter provides a summary and synthesis of the data from the two sites. We do not consider this report to be a definitive discussion of either site and hope that both will be analyzed in greater detail at some future date.

2. SEDIMENTARY STRATIGRAPHY

This chapter discusses the geologic setting of 45-OK-250 and 45-OK-4 with reference to local geologic history and describes the depositional history of the sites in detail. Strata mapped in excavation units are grouped into sitewide depositional units, which provide a basis for interpretation of the depositional environment and for correlation of cultural materials between units and the sites.

GEOLOGIC SETTING

The sites are located in the upper canyon of the project area. Here, the Columbia River flows along the eastern margin of the Waterville Plateau where the Columbia River Basalts contact the granitic rocks of the Colville Batholith. It is believed the river has flowed along the margin of the Plateau since the late Miocene outpouring of basalts. During the Pleistocene, the middle and northern reaches of the Columbia River drainage were overlain by ice sheets. The Okanogan Lobe of the Cordilleran ice sheet entirely filled the upper canyon to the Grand Coulee, reaching its maximum extent between 13,000 and 14,500 B.P. The ice wasted away earlier in the upper canyon than in the lower canyon. As a consequence, river waters ponded behind the ice dam, and the upper canyon was filled with a thick profile of glaciolacustrine sediments. When the ice dam in the lower canyon was finally breached, the Columbia River rapidly downcut through the lacustrine sediments with occasional stillstands, creating a deep, narrow valley with a prominent terrace system. Mazama tephra Layer O has been observed in alluvial fans built on to the 1000 ft terrace, indicating that the river reached this elevation before 7000 B.P., and probably reached historic elevations shortly thereafter.

Depositional and erosional processes responsible for altering the landscape since the rapid postglacial downcutting include lateral migration, point bar, and overbank deposition of the Columbia River; alluvial fan development; colluvial deposition; and aeolian deposition. Little floodplain development has taken place in this narrow valley, but natural levees and abandoned channels can be recognized in some areas. Surfaces less than 20 m above the historic river levels commonly exhibit overbank deposits. Local lateral migrations are recorded by the shape of the river, point bar formation, and erosional episodes in site profiles. Alluvial fans have been built on the terraces at the mouths of tributary canyons. Few permanent drainages occur in the project area: most drainage is intermittent and unintegrated. Talus slopes are common at the base of both granitic and basaltic bedrock formations. Erosion and colluvial redeposition of the thick glaciolacustrine sediments in the upper canyon is common. This may take the form of major landslides or small deposits. Aeolian deposits cover the surface of all but the youngest landforms.

Sites 45-OK-250 and 45-OK-4 are on a low terrace at a concave meander bend of the river, approximately 17-22 m above the historic river level. The sites slope gently up from the beach to an escarpment rising to the next terrace. The surficial site deposits are mapped as Nespelem silt (Figure 2-1). While Nespelem silts occur to the south, across the river, field data indicate surface deposits are more readily characterized as Qss, recent loessic and colluvial, as mapped to the north of the sites. The sites rest on a Columbia River bar significantly modified by alluvial fan debris. A network of draws deposited material in individual fans which coalesced, forming an alluvial apron. The lower margin of the apron has been eroded by the Columbia River.

PROCEDURES

Profiles were drawn during excavation at 45-OK-4 from December 1979 through February 1980. Additional profiles were completed from March through April 1980. Profiles were drawn during excavation from August through November 1979 at 45-OK-250 and additional profiles completed in December.

At 45-OK-4, 279 linear meters from 73 units and the re-excavated trench through Housepit 2 were profiled. Twelve column samples and 77 level sediment samples were collected. Three of the columns and 10 of the level samples were analyzed. Locations of profiled walls and column samples are shown in Figure 2-2.

Approximately 23 m of the river cutbank and 315 linear m from 61 units were profiled at 45-OK-250. Thirteen column samples and 41 level sediment samples were collected. Eighteen of the columns and eight of the level samples were analyzed. Locations of profiled walls and column samples are presented in Figure 2-3.

Profiling and sampling procedures were modified during sub-zero weather. Frozen walls were thawed with butane heaters so that stratigraphic boundaries could be recognized and strata described. Column samples were chipped out with a hammer and chisel and later dried in the laboratory. During this process, some walls weakened and collapsed before stratigraphic information could be recorded.

The natural depositional sequence discussed below is an interpretation based primarily on field profile descriptions. The results of microscopic examinations, and physical and chemical analyses (not included in the report) are referred to where pertinent. Physical descriptions are given for each depositional unit; sediment sources, transport mechanisms, environment of deposition, and post-depositional alteration are discussed where applicable. We use these natural depositional units in the final section of the chapter to define cultural analytic zones. Methods and procedures used in stratigraphic profiling, column sampling and sediment analysis, stratigraphic interpretation, and definition of analytic zones are described in more detail in the project's research design (Campbell 1984d).

Sites 45-OK-250 and 45-OK-4 share a similar depositional history with variation between the sites accounted for by their slightly different microenvironments. The sites were first analyzed separately and the strata independently labelled. At 45-OK-4 analysis was limited to identification of depositional units and some cultural strata.

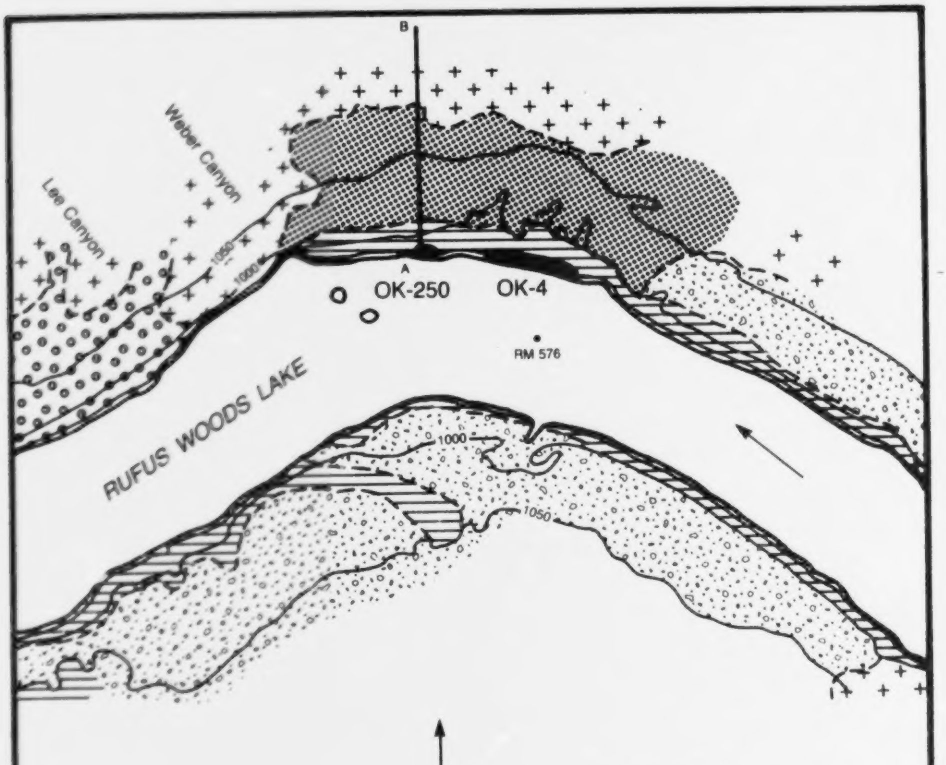

B
A
Weber Canyon
Lee Canyon
1050
1000
OK-250
OK-4
RM 576
RUFUS WOODS LAKE
1000
1050
N
0
1000
Feet
CROSS SECTION
1400
B
Feet
Site Location
950
A
Holocene
Late Pleistocene
Recent Loessic and Colluvial Deposits
Recent Alluvial Fans and Mud Flows
Columbia River Gravel
Nespelem Silt
Bedrock(Gneissic Granite)

Figure 2-1. Geologic map of site vicinity, 45-OK-250 and 45-OK-4.

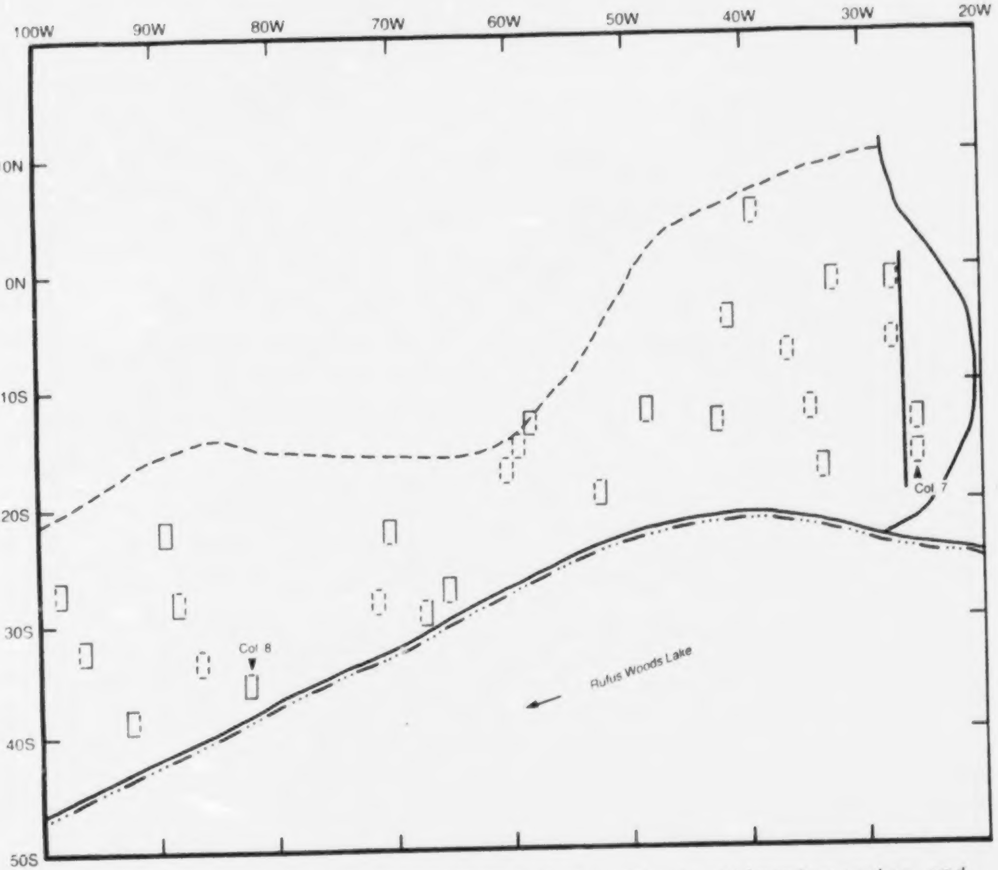

100W
90W
80W
70W
60W
50W
40W
30W
20W
10N
0N
10S
20S
30S
40S
50S
Col 8
Col 7
Rufus Woods Lake

Figure 2-2. Locations of profiled walls, column sediment samples and stratigraphic transects, 45-OK-4 (Area 4).

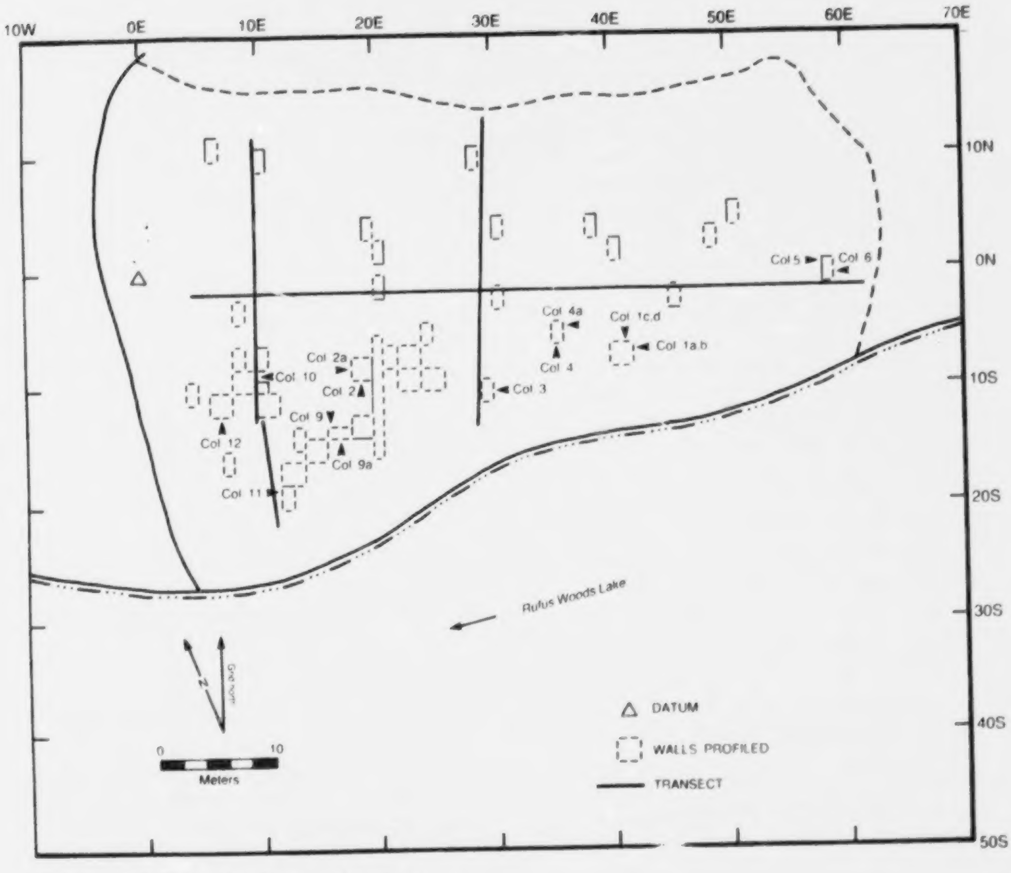

10W
0E
10E
20E
30E
40E
50E
60E
70E
10N
0N
10S
20S
30S
40S
50S
Col 5
Col 6
Col 4a
Col 1c,d
Col 1a,b
Col 4
Col 2a
Col 10
Col 2
Col 3
Col 9
Col 12
Col 9a
Col 11
Rufus Woods Lake
N
Grid north
0
10
Meters
DATUM
WALLS PROFILED
TRANSECT

Figure 2-2. Cont'd, (Area 3).

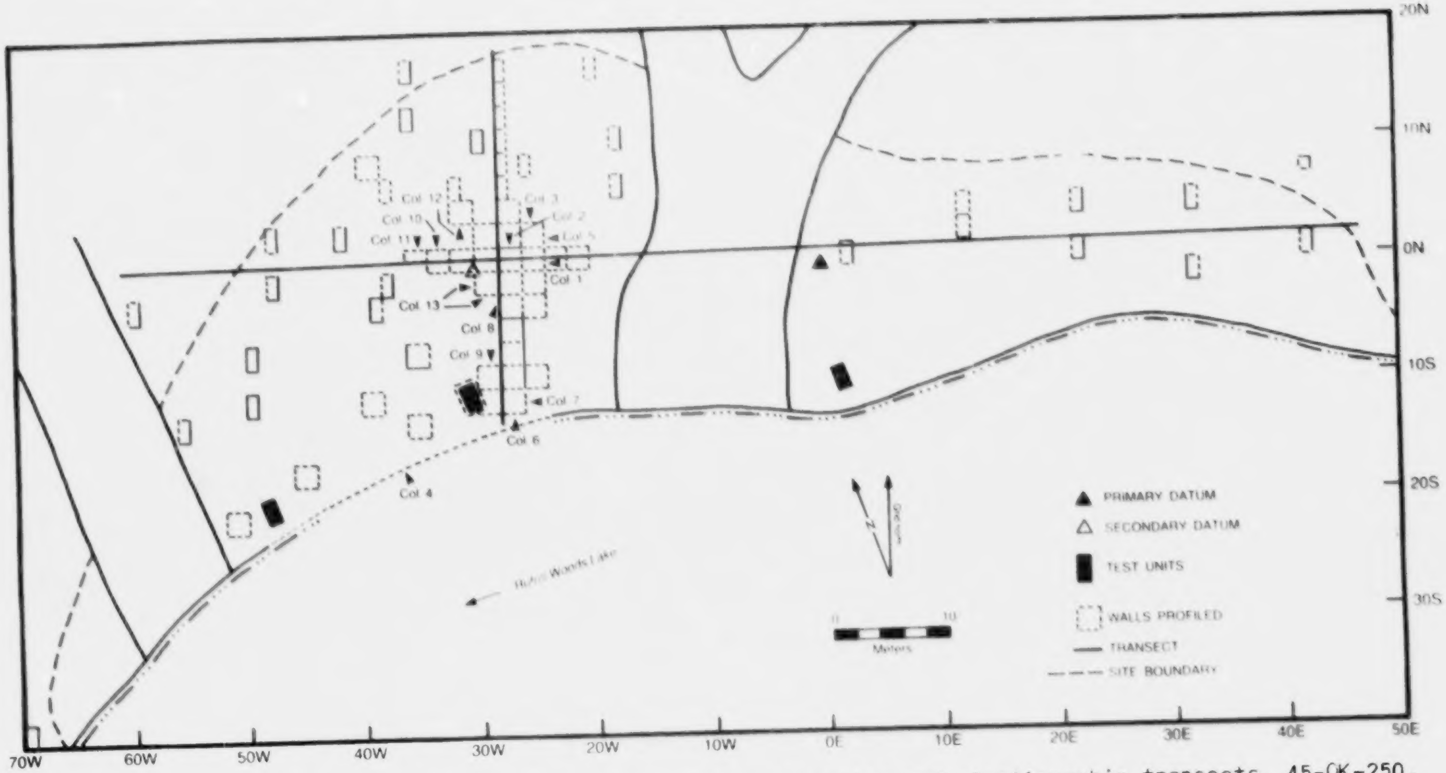

20N
10N
0N
10S
20S
30S
70W
60W
50W
40W
30W
20W
10W
0E
10E
20E
30E
40E
50E
Col 1
Col 2
Col 3
Col 4
Col 5
Col 6
Col 7
Col 8
Col 9
Col 10
Col 11
Col 12
Col 13
Rufus Woods Lake
N
Grid north
0
10
Meters
PRIMARY DATUM
SECONDARY DATUM
TEST UNITS
WALLS PROFILED
TRANSECT
SITE BOUNDARY

Figure 2-3. Locations of profiled walls, column sediment samples and stratigraphic transects, 45-OK-250.

DEPOSITIONAL SEQUENCE

Five stages of deposition characterized by distinct mechanisms of transport and environment of deposition have been defined as depositional units (Tables 2-1 and 2-2). North-south and east-west stratigraphic transects of each site are shown in Figures 2-4 through 2-9. Sample unit profiles are presented in Figures 2-10 and 2-11.

DU I: Alluvial Gravel Bar

A gravel bar deposit of the Columbia River consisting of well-bedded rounded gravels, pebbles and cobbles in a coarse sand matrix underlies portions of 45-OK-250 and 45-OK-4. This channel deposit indicates the position of the river before its present entrenchment. Boulders scattered throughout both sites represent remnants of glacial outwash.

At higher elevations and away from the river margin the sites are underlain by colluvial deposits from the northern terrace face and granitic alluvial deposits. The latter deposits are prominent in the Housepit 2 and 5 area of 45-OK-4. They consist of poorly sorted angular granitic fragments ranging in size from fine sand to cobbles. The 1000 ft terrace is capped by rounded river cobbles of varying lithology. The closest source for the angular granite is the cliffs to the north of the 1000 ft terrace. Although the deposit is poorly sorted and not internally bedded, we interpret it as part of an alluvial fan rather than a colluvial deposit. Colluvial deposition cannot account for transporting these materials across the intervening 1000 ft terrace; we assume they must have been transported by water in tributary canyons dissecting the terrace. A calcium carbonate or caliche layer is found on some of the alluvially deposited surfaces. This horizon may be a time marker as discussed by Fryxell (1973) representing a surface 4,500 years old.

The ealiest deposits were found to be culturally sterile in most instances. Occasionally, cultural material was found resting on the cobbles and at 45-OK-4, a coarse calcium carbonate welded granitic sand was found to underlie the floors of Housepits 2 and 5. Figures 2-12 and 2-13 show the extent of the basal deposits at each site.

DU II: Overbank and Slack water Deposits

DU II is represented by vertically accreted overbank alluvium and associated thin bands of fine-grained compact slack water sediments. The slack water bands were deposited as overbank waters retreated, leaving shallow ponds. Low levees formed along the shoreline as a result of overbank episodes may have blocked the retreat of water, thus causing ponding on the flood plain. As the water evaporated and percolated, clay loam and silt bedding were left. Overbank deposits are absent at higher elevations at 45-OK-250 and 45-OK-4. Iron staining occurs extensively in this depositional unit indicating alternating reducing and oxidizing conditions created by fluctuating water table levels possibly related to annual fluctuations in the river level (Birkeland 1974:66).

Table 2-1. Description of depositional units, 45-OK-250.

Depositional Unit	Type of Deposit	Strata	Physical Description
V	Aeolian	50, 75	Organic littermat. Sand to loamy sand, 10YR6/2 to 10YR6/3, moderate to well sorted singular blocky structure, soft consistence, boundaries abrupt to gradual, smooth.
IV	Wind modified alluvium	51,100, 102,105, 110,111, 112	Strata 100, 102, 105 represent predominantly aeolian fill with some alluvial wash overlying HP1 and the southern surfaces. Loamy sand to sandy loam, 10YR6/3, 7/2, and 6/3, moderately to well sorted, soft consistence, boundaries abrupt to clear, wavy. Stratum 110 occurs outside of and between HP1 and the southern surfaces. Represents deposits contemporary with latest housepit occupation. Contains considerable cultural material. Sandy loam, 10YR6/3, moderately sorted slightly hard consistence, boudary clear to abrupt, wavy to smooth.
IVa	Cultural	150,160, 116=pit	HP 1 rim and living floor and southern surfaces. Sand to loamy sand, 10YR6/2 to 5/3, moderately well-sorted, fine blocky structure, soft consistence, boundary clear to abrupt, wavy. Extensive charcoal staining, cultural mateiral.
III	Slope wash and alluvial fan	112,113, 115,116, 121,125, 126,130, 170,225	Underlies stratum 110. Similar to stratum 110 but with more alluvial gravel, subangular to subrounded, moderate to poor sorting, gradual to abrupt boundaries. Sandy loam to loamy sand, 10YR6/3, moderately well sorted, slightly hard consistence, boundaries clear to gradual, wavy. Stratum 125 is truncated by HP 1.
II	Overbank	200's	Series of overbank sands and slackwater silts. Clay loam to loamy sand, 10YR6/3 to 10YR7/3, moderately sorted to well sorted, slightly hard consistence, boundary clear to abrupt, wavy. Portions of this unit were cut into by construction of HP 1.
I	Channel gravels, alluvial fan, colluvial slope wash	300	Fine sand matrix with 70% water worn cobbles, poorly sorted. Light yellowish brown (2.5Y6/4). Pebble and cobble layer in fine sand matrix, very poorly sorted, structureless, slightly hard consistence. Rock types include 60% granitic, 40% basalt.

Table 2-2. Description of depositional units, 45-OK-4.

Depositional Unit	Type of Deposit	Strata	Physical Description
V	Aeolian	50	Organic littermat. Sand to loamy sand, 10YR6/2 to 10YR6/3, moderate to well sorted singular blocky structure, soft consistence, boundaries abrupt to gradual, smooth.
IV	Wind modified alluvium	70, 75, 98,100, 102,103,	Strata 100, 102, 105 represent predominantly aeolian fill with some alluvial wash overlying HP1 and the southern surfaces. Loamy sand to sandy loam, 10YR6/3, 7/2, and 6/3, moderately to well sorted, soft consistence, boundaries abrupt to clear, wavy. Stratum 110 occurs outside of and between HP1 and the southern surfaces. Represents deposits contemporary with latest housepit occupation. Contains considerable cultural material. Sandy loam, 10YR6/3, moderately sorted slightly hard consistence, boundary clear to abrupt, wavy to smooth. Strata designated represent fill in structural areas of HP 2.
IVa	Cultural	60, 71, 99,104, 104,105, 149,150, 160	Strata designated represent floors and contemporary surfaces of HP's and structure. Stratum 149 is a cultural stratum above the HP 5 floor.
III	Slope wash and alluvial fan	400	Stratum 400 represents a non-housepit occupation layer in Area A.
II	Overbank	220,250	Series of overbank sands and slackwater silts. Clay loam to loamy sand, 10YR6/3 to 10YR7/3, moderately sorted to well sorted, slightly hard consistence, boundary clear to abrupt, wavy. Portions of this unit were cut into by construction of HP 1.
I	Channel gravels, alluvial fan, colluvial slope wash	300	Fine sand matrix with 70% water worn cobbles, poorly sorted. Light yellowish brown (2.5Y6/4). Pebble and cobble layer in fine sand matrix, very poorly sorted, structureless, slightly hard consistence. Gravel and cobble layer (too coarse for color), 60% angular to subangular gravel, 25% subangular to subrounded medium gravel, and 15% subangular pebbles and cobbles with small amount fine/medium/coarse sand, very well compacted, partially cemented with $CaCO_3$ near top of level, poorly sorted, boundary: unknown. Rock types include 60% granitic, 40% basalt.

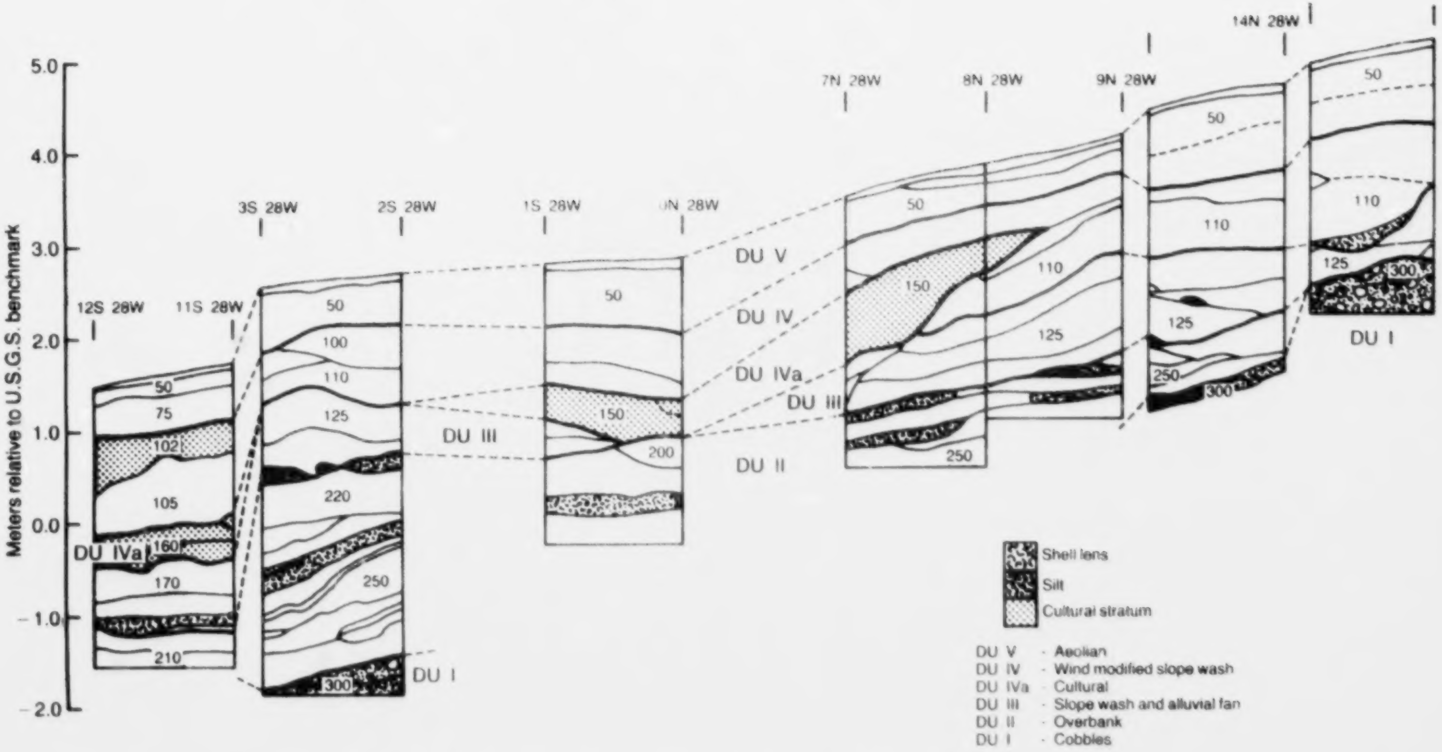

5.0
4.0
3.0
2.0
1.0
0.0
- 1.0
- 2.0
Meters relative to U.S.G.S. benchmark
12S 28W
11S 28W
3S 28W
2S 28W
1S 28W
0N 28W
7N 28W
8N 28W
9N 28W
14N 28W
50
75
102
105
160
170
210
100
110
125
220
250
300
150
200
DU V
DU IV
DU IVa
DU III
DU II
DU I
Shell lens
Silt
Cultural stratum
DU V - Aeolian
DU IV - Wind modified slope wash
DU IVa - Cultural
DU III - Slope wash and alluvial fan
DU II - Overbank
DU I - Cobbles

Figure 2-4. North-south transect at 28W, 45-OK-250. For plan map, see Figure 2-3.

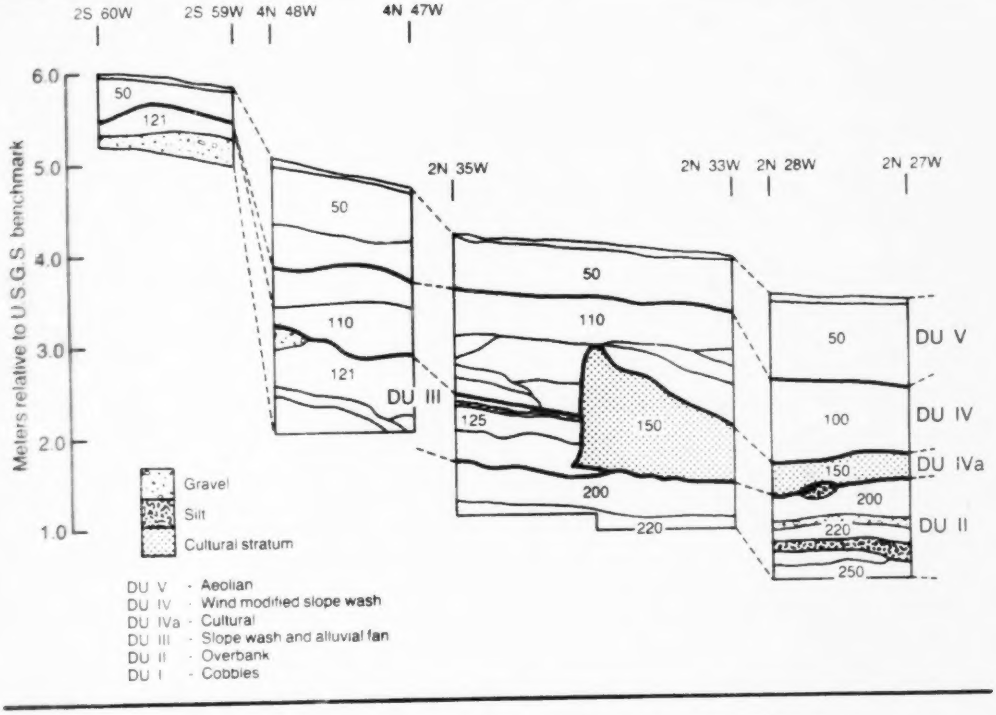
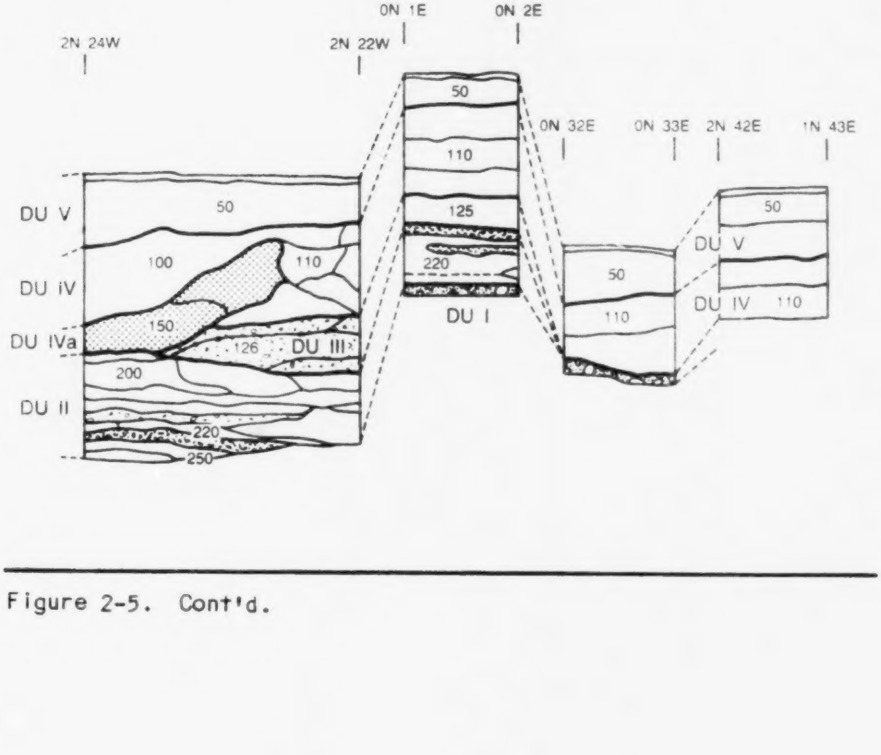

2S 60W
2S 59W
4N 48W
4N 47W
2N 35W
2N 33W
2N 28W
2N 27W
Meters relative to U.S.G.S. benchmark
6.0
5.0
4.0
3.0
2.0
1.0
50
121
110
125
150
100
200
220
250
DU V
DU IV
DU IVa
DU III
DU II
Gravel
Silt
Cultural stratum
DU V - Aeolian
DU IV - Wind modified slope wash
DU IVa - Cultural
DU III - Slope wash and alluvial fan
DU II - Overbank
DU I - Cobbles

Figure 2-5. East-west transect at 2N, 45-OK-250. For plan map, see Figure 2-3.



2N 24W
2N 22W
0N 1E
0N 2E
0N 32E
0N 33E
2N 42E
1N 43E
DU V
DU IV
DU IVa
DU II
DU III
DU I
DU V
DU IV
50
100
110
150
126
200
220
250
50
110
125
220
50
110
50
110

Figure 2-5. Cont'd.

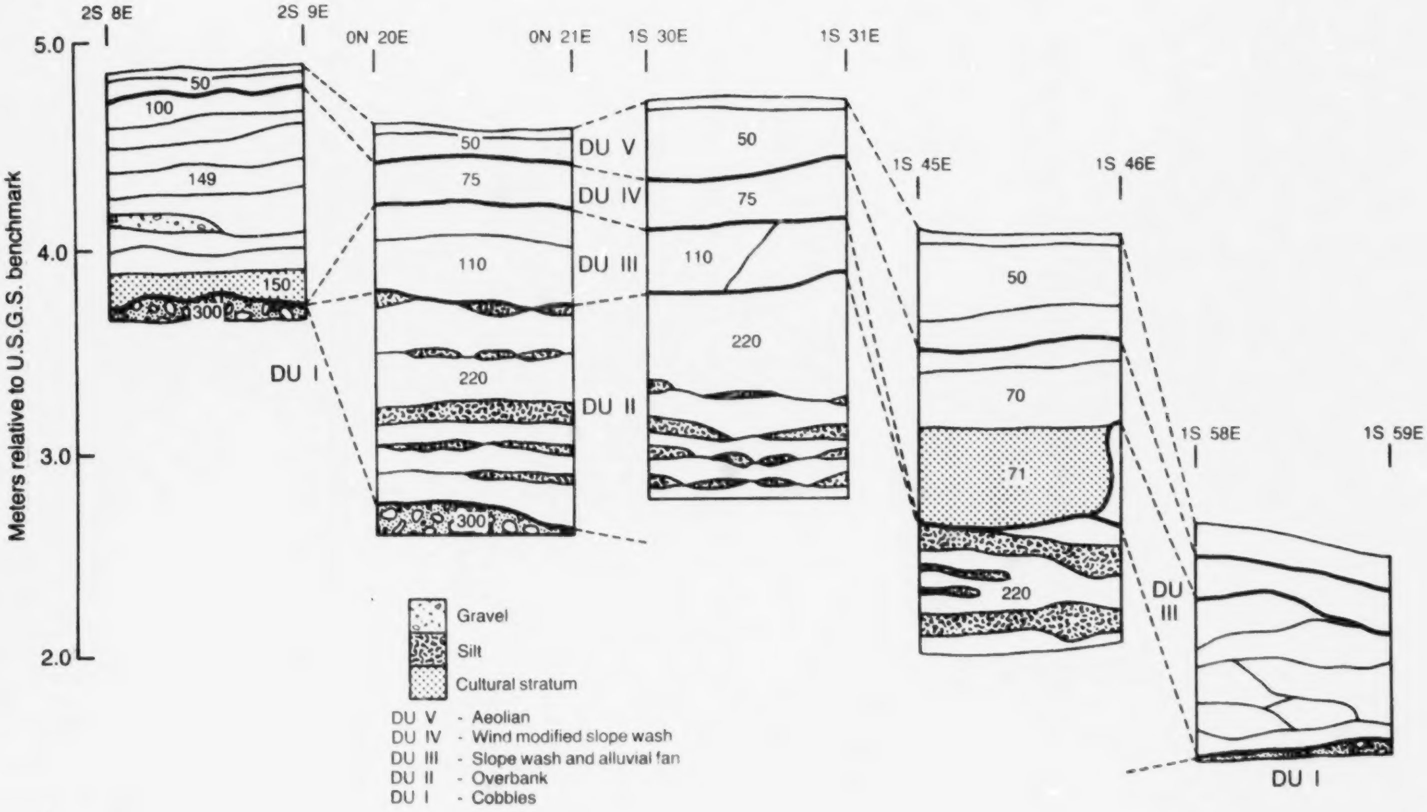

2S 8E
2S 9E
0N 20E
0N 21E
1S 30E
1S 31E
1S 45E
1S 46E
1S 58E
1S 59E
5.0
4.0
3.0
2.0
Meters relative to U.S.G.S. benchmark
50
100
149
150
300
DU I
50
75
110
220
300
DU V
DU IV
DU III
DU II
50
75
110
220
50
70
71
220
DU III
DU I
Gravel
Silt
Cultural stratum
DU V - Aeolian
DU IV - Wind modified slope wash
DU III - Slope wash and alluvial fan
DU II - Overbank
DU I - Cobbles

Figure 2-6. East-west transect at 1S, 45-OK-4 (Area 3). For plan map, see Figure 2-2.

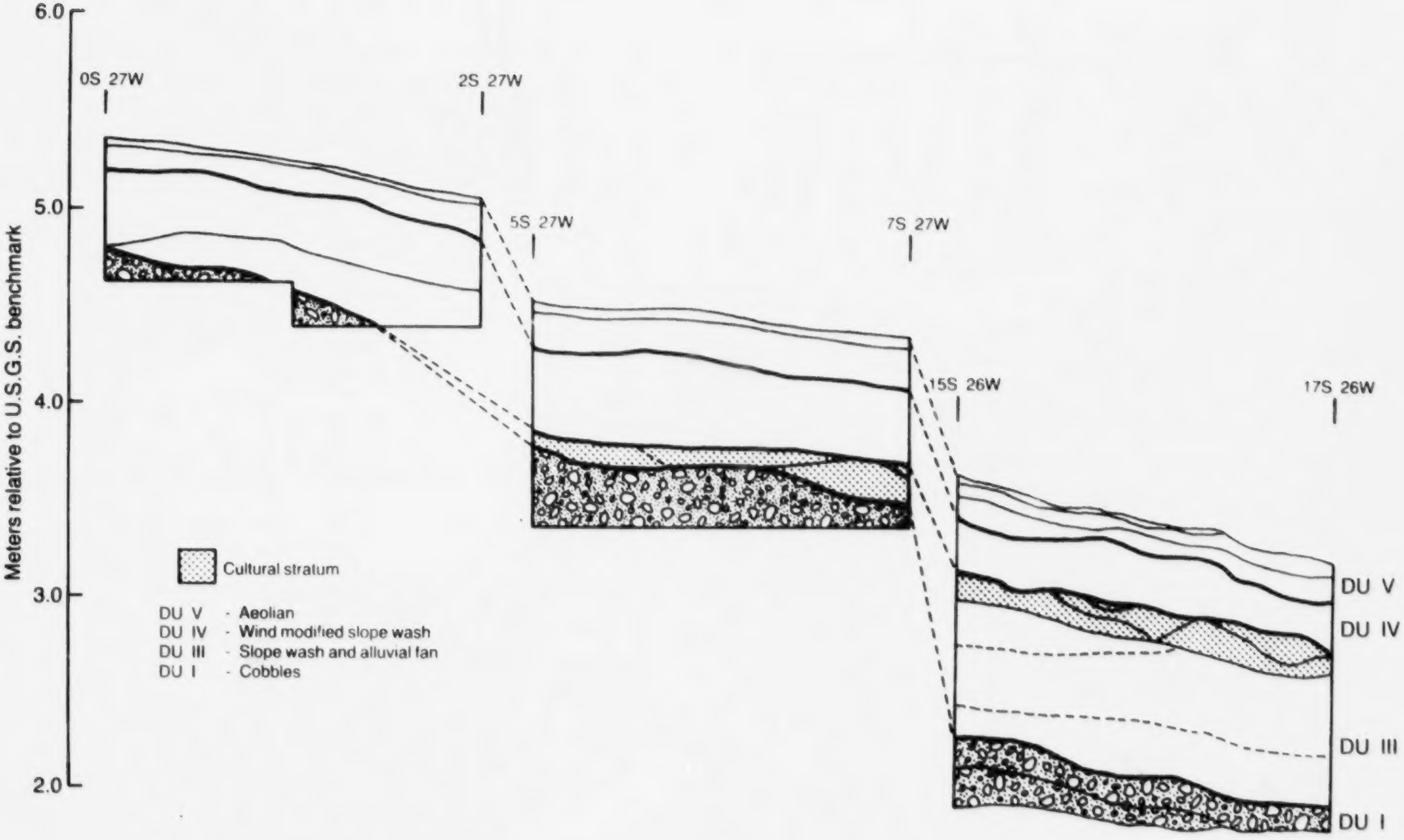

6.0
5.0
4.0
3.0
2.0
Meters relative to U.S.G.S. benchmark
0S 27W
2S 27W
5S 27W
7S 27W
15S 26W
17S 26W
Cultural stratum
DU V - Aeolian
DU IV - Wind modified slope wash
DU III - Slope wash and alluvial fan
DU I - Cobbles
DU V
DU IV
DU III
DU I

Figure 2-7. North-south transect at 27W, 45-OK-4 (Area 4). For plan map, see Figure 2-2.

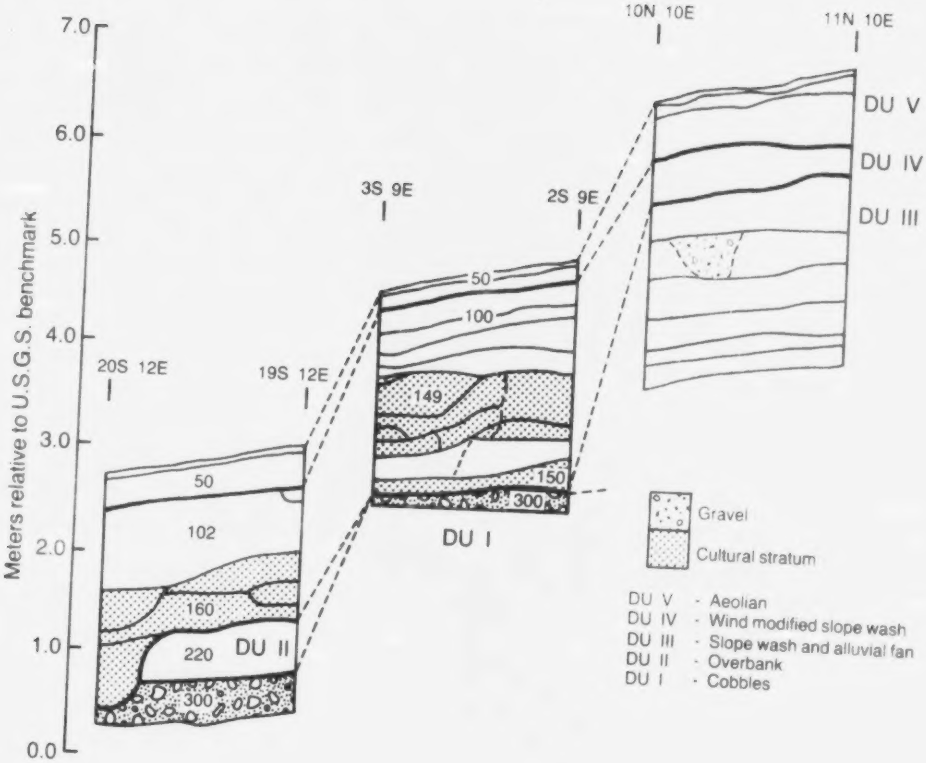

7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
Meters relative to U.S.G.S. benchmark
20S 12E
19S 12E
3S 9E
2S 9E
10N 10E
11N 10E
50
102
160
220
DU II
300
50
100
149
150
300
DU I
DU V
DU IV
DU III
Gravel
Cultural stratum
DU V - Aeolian
DU IV - Wind modified slope wash
DU III - Slope wash and alluvial fan
DU II - Overbank
DU I - Cobbles

Figure 2-8. North-south transect at 10E, 45-OK-4 (Area 3). For plan map, see Figure 2-2.

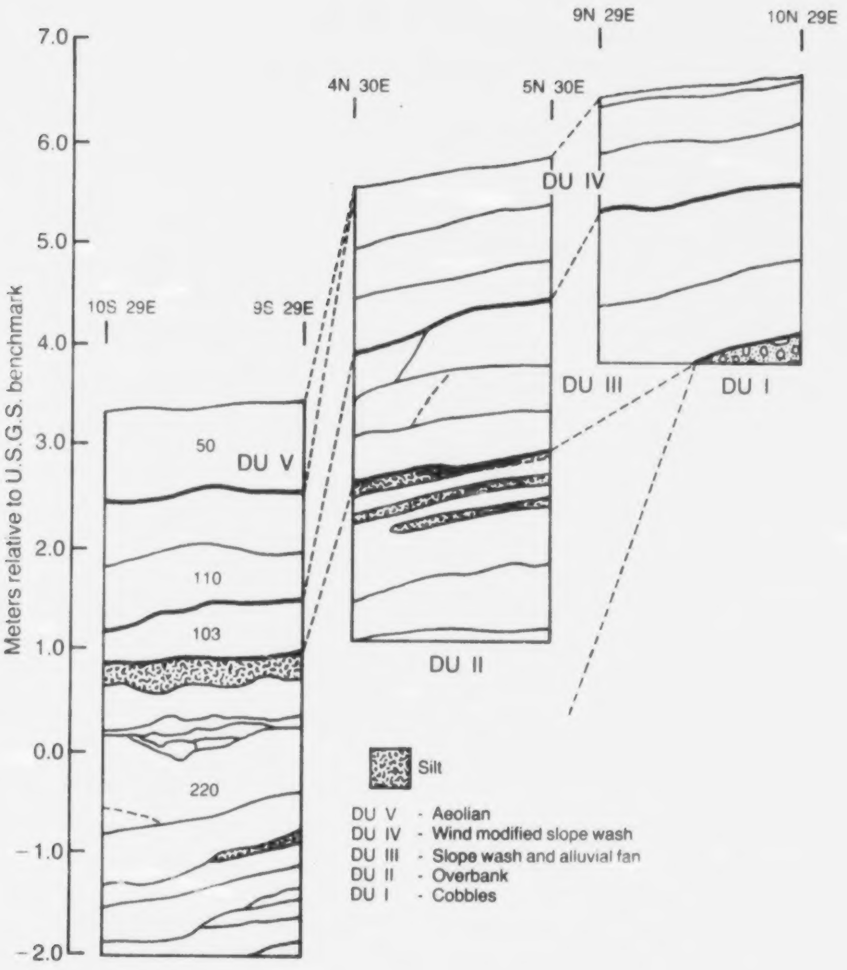

9N 29E
10N 29E
4N 30E
5N 30E
10S 29E
9S 29E
Meters relative to U.S.G.S. benchmark
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
DU IV
DU III
DU I
DU V
DU II
50
110
103
220
Silt
DU V - Aeolian
DU IV - Wind modified slope wash
DU III - Slope wash and alluvial fan
DU II - Overbank
DU I - Cobbles

Figure 2-9. North-south transect at 29E, 45-OK-4 (Area 3). For plan map see Figure 2-2.

Field Stratum	Grouped Strata	DESCRIPTIONS
A	50	Brown (10YR4/3) to dark brown (10YR5/3) loamy sand, predominately very fine sand with occasional coarse grains. Litter mat contains large percentage roots, organic debris, platy structure, moderately well sorted. Boundary abrupt/smooth.
1	50	Brown (10YR4/3) to dark brown (10YR5/3), higher value at top of level, loamy sand/sand, predominately very fine sand, occasional coarse sand with fine to medium gravel clasts. Platy structure, moderately sorted, soft consistence, more compact towards top of layer. Large quantity sage roots. Boundary gradual/smooth.
2	100	Yellowish brown (10YR5/4) sand, predominately fine sand, occasional coarse sand grains, lighter color and less fine and medium gravel than Stratum 1, very soft consistence, moderately well sorted, massive and structureless. Boundary clear/wavy.
117	110	Pale brown to very pale brown (10YR6/3 to 7/3) very fine sand, some medium sand. Moderately sorted, soft, moderately compacted, more compact than layer above, large quantity of shell, charcoal flecks, small bone fragments. Boundary clear.
118	110	Brown to yellow brown (10YR5/3 to 6/4) very fine to fine sand, soft consistence, moderately sorted, occasional shell fragments, similar to Stratum 117 except for color. Boundary clear.
29	110	Pale brown (10YR5.5/3) sand, predominately fine sand and very fine sand, soft consistence, moderately well sorted, occasional fine gravel and diffuse silt patches, some shell. Slightly modified by soil development at top of level, distinctly lighter in color than Strata 28 and 2. Boundary clear to gradual, wavy with 30, clear with 28.
30	125	Very pale brown (10YR7/3) sand, predominately fine sand, very similar to Stratum 29, somewhat coarser grained and better sorted. Not modified by soil development, contains diffuse charcoal staining, occasional charcoal flecks, shell and bone fragments. Boundary gradual/smooth.
31	125	Very pale brown (10YR7/3) sand, almost identical texture to Stratum 30, slightly higher value than Stratum 30, not as disturbed by krotovina. Boundary clear/wavy.
119	125	Pale brown (10YR6/3) mixture of fine and medium sand; well sorted, slightly hard consistence, occasional fine gravel clasts. Very mottled by krotovina, contains occasional shell fragments and charcoal flecks. Boundary clear.
32	220	Pale brown/very pale brown (10YR6.5/3) loamy sand to sandy loam, approximately 20% silt, predominately very fine sand, slightly hard to hard consistence, moderately sorted. Boundary clear/wavy.
27	220	Pale brown (10YR6/3) loamy sand, predominately fine sand, well sorted, slightly hard consistence. Boundary abrupt to clear.
121	220	Pale brown to very pale brown (10YR6/3 to 7/3) 60% medium sand, 40% fine sand, moderately well sorted, soft consistence. Boundary clear to abrupt.
122	220	Very pale brown (10YR7/3) 80% medium sand, 10% fine sand, 10% coarse sand, loose, well sorted. Boundary abrupt.
123	220	Pale brown (10YR6/3) similar to Stratum 122, a highly oxidized sand exhibiting a slight reddish color, loose. Boundary abrupt.
38	220	Between pale brown and brown (10YR5.5/3) fine sand and silt with 20% medium sand, moderately to poorly sorted. Soft, occasional loose patches, abundant charcoal and oxidized sand, some shell. Feature 120. Boundary clear, wavy.
40	220	Pale brown (10YR6/3) sand to fine sand, slightly loose consistence, moderately sorted. Boundary clear/wavy.
124	220	Light yellowish brown to very pale brown (10YR6/4 to 7/4) loamy sand with 25% silt, 25% medium sand, moderately sorted, soft. Boundary clear.
21	250	Very pale brown (10YR7/3) sandy loam, well sorted, highly compact, soft to slightly hard consistence, occasional patches of fine sand. Boundary abrupt/smooth.
126	250	Pale brown to very pale brown (10YR6/3 to 7/4) medium sand, well sorted, loose. Boundary clear.
127	250	Pale brown (10YR6/3) same grain size as 126 but heavily oxidized with slightly reddish color, loose. Boundary abrupt.
22	250	Very pale brown (10YR7/3) to salt and pepper sand, fine to medium sand, moderately sorted, loose consistence. Occasional small fragments. Boundary clear/smooth.
128	250	Salt and pepper, 40% coarse sand, 60% medium sand, well sorted, loose. Boundary clear to abrupt.
129	250	Similar to Stratum 128.
130	250	Very pale brown (10YR7/3) fine to medium sand, moderately well sorted. Boundary clear.
131	250	Pale brown (10YR6/3), fine sand, moderately well sorted, loose. Boundary clear.
132	250	Very pale brown to pale brown (10YR6/3 to 7/3) medium sand, well sorted, coarser than levels above. Boundary abrupt.
140	250	Yellowish brown (10YR5/4 moist) loamy to very fine sand with 10% medium sand, moderately well sorted, more compact than levels above and below it.
133	300	Dark yellowish brown (10YR4/4) loamy sand, predominately very fine sand with silt, moderately well sorted. Oxidized sediment, very moist and compact. Boundary abrupt.
134	300	Brown to yellowish brown (10YR5/3 to 5/4) fine sand, well sorted, soft consistence, fill between cobbles. Boundary abrupt.

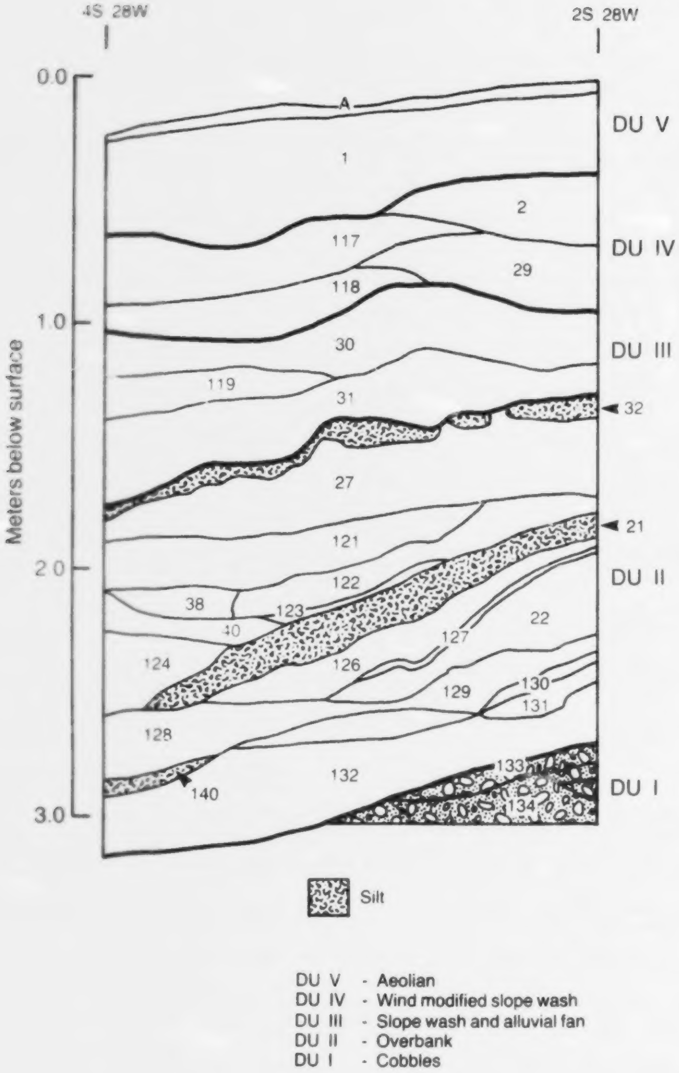

4S 28W
2S 28W
0.0
1.0
2.0
3.0
Meters below surface
A
1
2
117
29
118
30
119
31
32
27
121
21
122
38
123
40
22
127
124
126
129
130
131
128
132
133
140
134
DU V
DU IV
DU III
DU II
DU I
Silt
DU V - Aeolian
DU IV - Wind modified slope wash
DU III - Slope wash and alluvial fan
DU II - Overbank
DU I - Cobbles

Figure 2-10. Sample profile, 45-OK-250.

Field Stratum	Grouped Strata	DESCRIPTION
A	50	Brown (10YR5/3) fine to very fine sand, soft consistence, moderately sorted. Very disturbed, irregular litter mat mixed with backdirt and recently eroded slope wash material. Boundary diffuse/irregular to broken.
1	50	Brown/dark brown (10YR4.75/3) very fine sand moderately well sorted, soft consistence indistinct platy structure at the top, absent the bottom. Slightly darker and more compact than level below, contains 3-5% fine angular granitic gravel, occasional small, moderately rounded pebbles. A Horizon. Boundary gradual.
2	100	Brown (10YR5/3) fine sand/loamy sand moderately sorted, contains 7% fine angular gravel and 3% sub-angular to sub-rounded small to large pebbles, occasional colluvial boulders and cobbles, soft consistence. Some pebbles may be fire modified. Contact distinct in vicinity of FMR scatters but indistinct elsewhere. Boundary clear to indistinct.
44	149	Brown (10YR5/3) loamy sand, fine, moderately well sorted, contains some cultural debris and staining but appears to be a natural deposit which lenses out partially capping the housepit fill, soft consistence. Boundary clear/gradual and wavy.
5	149	Light grey/very pale brown (10YR7/2.5) sand, 50% medium, 30% coarse, 20% fine, occasional sub-rounded fine gravel clasts, moderately well sorted, very soft to loose consistence. Stratum lenses out suggesting housepit fill. Boundary abrupt but often disturbed by krotovina.
45	149	Brown (10YR5/3) very fine to fine sand, moderately sorted, soft consistence. Boundary clear/gradual smooth.
36	149	Dark brown/brown (10YR4/3) sand, almost entirely fine sand with some medium sand, well sorted, soft consistence. Cultural layer contains shell, bone, FMR, charcoal staining. Boundary gradual.
47	150	Pale brown (10YR6/3) sand, very fine, well sorted, minimal cultural staining. Boundary gradual/irregular.
47a	150	Same as Stratum 47, but lower value due to increased cultural staining and mottling.
6	150	Brown (10YR6/3) sand, 25% medium sand, 75% fine sand, moderately well sorted, soft consistence with numerous sub- to well-rounded medium and fine gravel clasts. Housepit 2 floor deposit, large quantities of mammal bone, scattered shell, abundant charcoal flecks, occasional FMR, uniformly stained by organic material, charcoal stained in many places. Truncates and lies unconformably upon sand and gravel deposits. Boundary abrupt except with Stratum 7.
7	150	Greyish brown/dark greyish brown (10YR5/2 to 4/2) sand, same basic matrix as Stratum 6, but with extremely heavy charcoal staining. Dense concentrations of mammal bone and associated cultural debris. Boundary abrupt to clear.
53	150	Very pale brown (10YR7/4) loamy sand/sandy loam, very fine/fine, well sorted, associated with gravel and cobble layer, soft consistence. Boundary clear/irregular.
✓ 53a	150	Same matrix as Stratum 53, but exhibits moderate staining. No cultural association, staining may be from above or possible pit.
54	300	Light yellowish brown (10YR6/4) sand and gravels associated with Stratum 10. Medium sand to small sub-angular gravels, loose consistence. Boundary unknown.
10	300	(Too coarse for color) gravel and cobble layer. 60% fine sub-angular to angular gravel, 25% sub-angular to sub-rounded medium gravel and 15% sub-angular pebbles and cobbles with a small amount of fine/medium/coarse sand. Very well compacted, partially cemented with CaCO3 near the top of the level, pebbles calcified on lower side, unbedded and poorly sorted and completely unbedded. Very uneven upper contact, boundary unknown.
48	220	Light yellowish brown (10YR6/4) loamy sand very fine, well sorted, soft consistence. Truncated by housepit, represents surface of original excavation. Boundary gradual/smooth.
49	220	Pale brown (10YR6/3) sand, fine, well sorted, soft consistence. Truncated by housepit. Boundary gradual/smooth.
50	220	Brown/pale brown (10YR5/3 to 6/3) loamy sand, very fine, well sorted, soft consistence. May represent occupation older than the housepit but contains little cultural material and displays minimal staining. Truncated by housepit. Boundary clear/smooth.
51	220	Very pale brown (10YR7/3) loamy sand, fine, well sorted, soft to slightly hard consistence. Boundary clear/gradual.

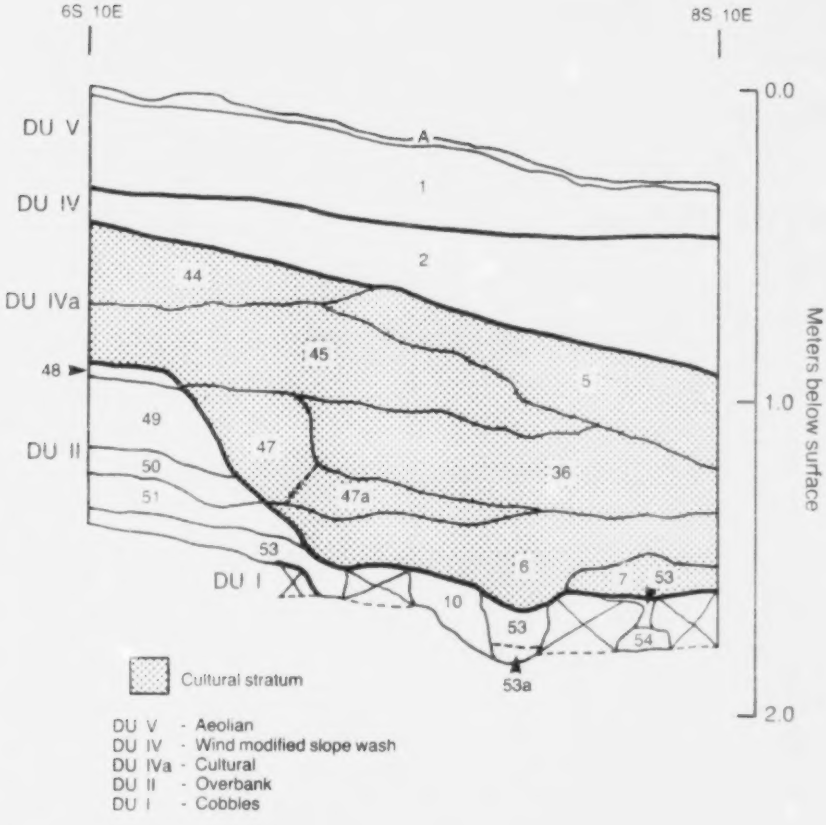

6S 10E
8S 10E
0.0
1.0
2.0
Meters below surface
DU V
DU IV
DU IVa
48
DU II
DU I
A
1
2
44
45
5
49
47
36
50
51
47a
53
6
7
53
10
53
54
53a
Cultural stratum
DU V - Aeolian
DU IV - Wind modified slope wash
DU IVa - Cultural
DU II - Overbank
DU I - Cobbles

Figure 2-11. Sample profile, 45-OK-4.

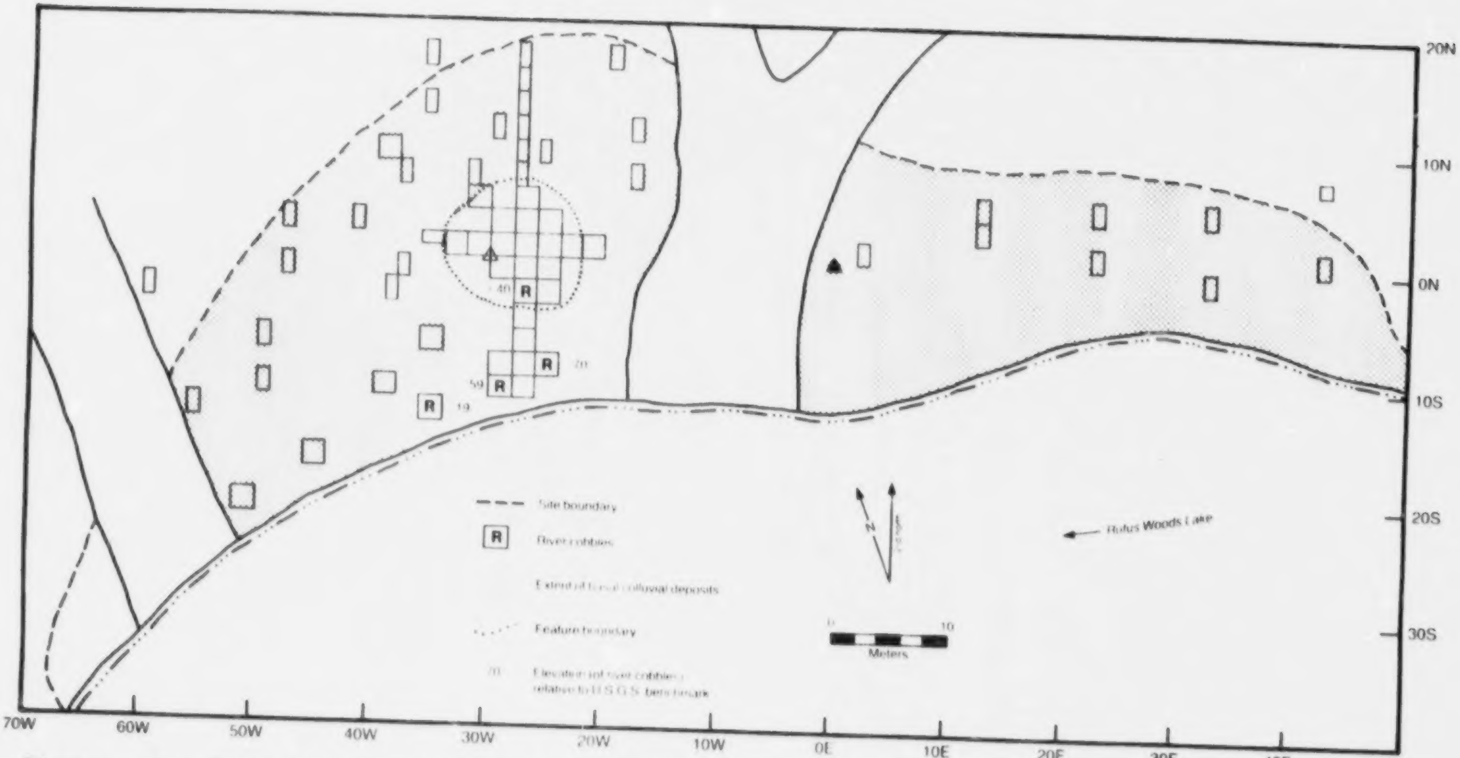

20N
10N
0N
10S
20S
30S
70W
60W
50W
40W
30W
20W
10W
0E
10E
20E
30E
40E
50E
R
40
R
20
59
R
R
19
Site boundary
River cobbles
Extent of basal colluvial deposits
Feature boundary
20
Elevation of river cobbles relative to U.S.G.S. benchmark
N
0
10
Meters
Rufus Woods Lake

Figure 2-12. Basal DU I deposits, 45-OK-250.

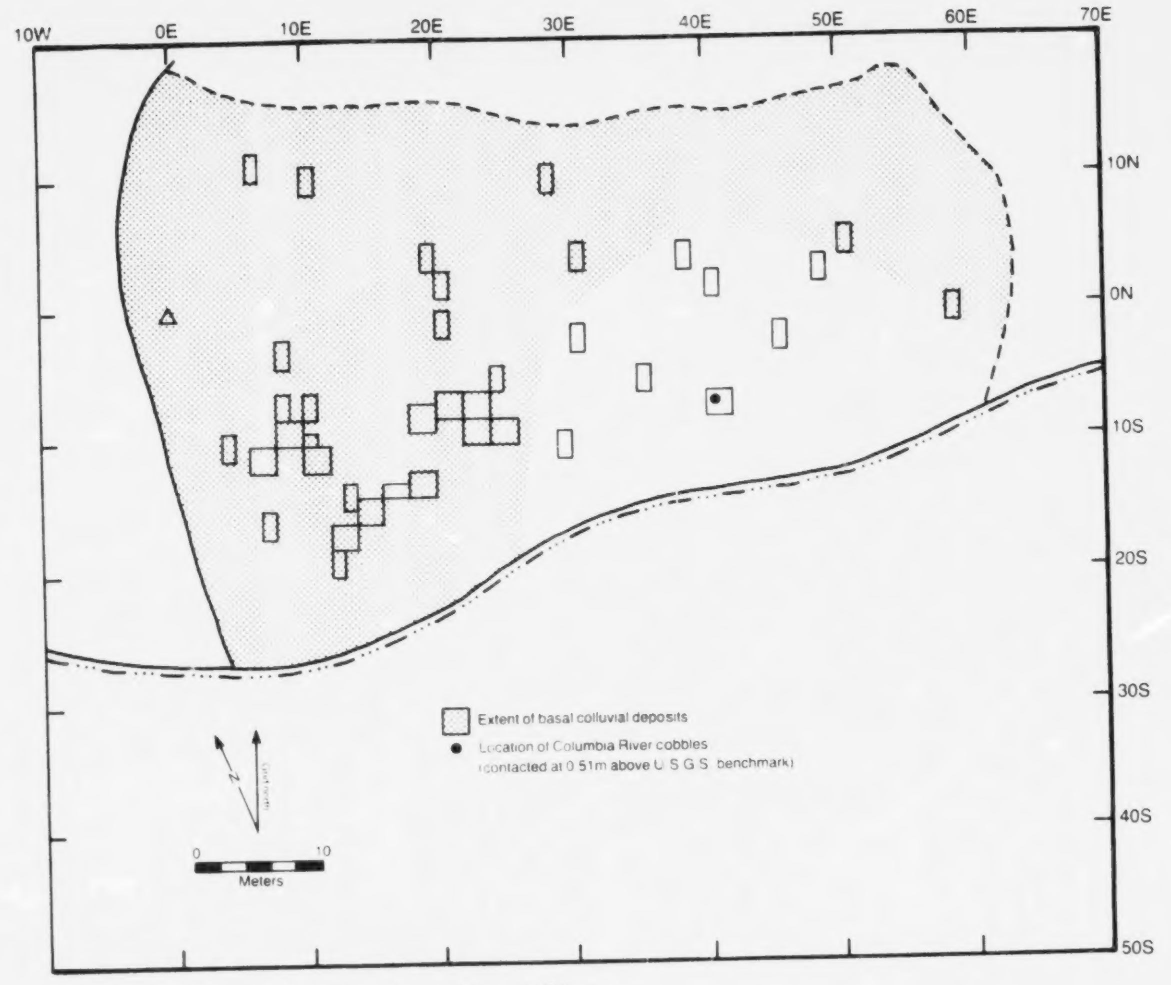

10W
0E
10E
20E
30E
40E
50E
60E
70E
10N
0N
10S
20S
30S
40S
50S
Extent of basal colluvial deposits
Location of Columbia River cobbles
(contacted at 0.51m above U.S.G.S. benchmark)
N
Grid north
0
10
Meters

Figure 2-13. Basal DU 1 deposits, 450K-4.

DU III: Slope Wash and Alluvial Fan Debris

Sedimentary materials continued to migrate from higher elevations through the numerous draws and network channels of ephemeral streams onto the DU I alluvial fan deposits and the DU II overbank deposits. In the wake of this migration, pockets of subangular gravel and poorly sorted alluvium were deposited. Although lessening in intensity in the later DUs this accretion was a continual process. The coarser sediments were deposited closer to the main source to site north, while the finer sediments were carried further south. Smaller ephemeral streams broke into multiple channels branching into distributary networks, adding to the complex maze of the flood basin deposits. The natural sorting of grains sizes by water and the overlapping of microdrainage basins mixed the sediments.

DU IV: Slope Wash and Aeolian Sediments

This DU is similar to DU III except that aeolian deposition also is important. It contains subangular grains deposited by gentle slope wash and rain splash as well as the subrounded to subangular, pitted, fine sand indicative of aeolian transport. Extensive cultural deposits occur in this depositional unit and these have been labelled Depositional Subunit IVa (Table 2-1). The characteristics of this depositional unit are project wide as well as Columbia Basin wide. A number of reports stress a sequence of moderating alluvial activity followed by increased aeolian sedimentation beginning several thousand years ago (Fryxell and Daugherty 1963; Leonhardy 1970; Fryxell 1973; and Kennedy 1976).

DU V: Aeolian Sediments and Surface Litter Mat

DU V includes a stratum of organic stained aeolian sediments and the overlying surface litter layer. Slope wash gravel was found in some excavation units. The moderately well sorted sandy loam to loamy sand grains are similar in surface attributes (e.g., pitting) to those collected in a wind trap at 45-OK-258 some three km downstream. Grasses and rootlets are abundant.

CULTURAL ANALYTIC ZONES

Zones have been defined independently at 45-OK-250 and 45-OK-4 and therefore are discussed separately below. They are correlated at the conclusion of this chapter on the basis of stratigraphic information, radiocarbon dates and projectile point styles.

ZONES, 45-OK-250

The zones defined for 45-OK-250 are summarized in Table 2-3 which shows their relation to stratigraphic deposits, radiocarbon dates and cultural contents. Zones 11 through 15 were defined for the housepit area, areas to the north and south and several nearby units for which stratigraphic information was available. Zones 21 through 24 were defined in the remaining unrelated units. The horizontal extent of the zones is shown in Figure 2-14. The zones are discussed below from oldest to youngest.

Table 2-3. Analytic zones of 45-OK-250; their stratigraphic definition, radiocarbon dates and contents.

Zone	DU	Strata	Description	Radiocarbon[1] Dates B.P.	Lithics N	Modified Non-Lithics N	Bone N gms	Shell[2] N gms	FMR N gms	Total[3] Artifacts	Features N	Volume m^3	Density Objects/m^3
		Housepit Area (1)											
11	V	50	Aeolian and slope wash	-	2,446	47	17,437 3,048	1,967 1,069	726 231,296	22,693	2	53.8	421.8
12	IV	75,100	Slope wash and aeolian	-	3,517	72	61,106 13,516	16,417 8,100	1,971 211,572	83,083	7	49.4	1,681.8
13	IVa	100,105 110,150	Cultural strata	2989 ± 78 3143 ± 65 3188 ± 78 3194 ± 153 3219 ± 95 3328 ± 105 3453 ± 97	7,243	144	133,410 28,700	34,585 16,744	3,295 402,978	178,677	20	52.3	3,416.4
14	III	125,128 170,225	Slope wash and alluvial fan	-	1,681	27	16,170 4,065	4,157 1,281	425 56,057	22,460	1	28.0	802.1
15	II, I	200,210 220,250 300	Overbank, basal gravels	4448 ± 123	526	22	14,040 4,217	11,403 1,140	187 31,280	26,158	6	66.3	394.5
		Total			15,413	312	242,163	68,529	6,604	333,071	36	249.8	
		Nonhousepit Area (2)											
21	V	50, 51 75	Aeolian	-	648	30	2,311 550	322 573	157 20,678	3,468	-	34.7	100.0
22	IV	110,111 116	Slope wash and aeolian	-	1,126	27	7,684 1,846	7,827 25,103	342 127,714	17,006	7	37.9	448.7
23	III	112,113, 115,120, 121,125, 126	Slope wash and alluvial fan	3348 ± 89	525	28	5,320 1,268	2,184 6,836	124 50,714	8,181	3	37.4	218.7
24	II, I	220,250 300	Overbank, basal gravels	-	79	3	690 182	2,511 575	17 2,608	3,300	1	13.6	242.6
		Total			2,378	88	16,005	12,844	640	31,955	11	123.6	

[1] See Appendix A for additional information on radiocarbon dates.
[2] In 42 excavation units shell was counted and weighed, in the remaining 23 units it was only counted.

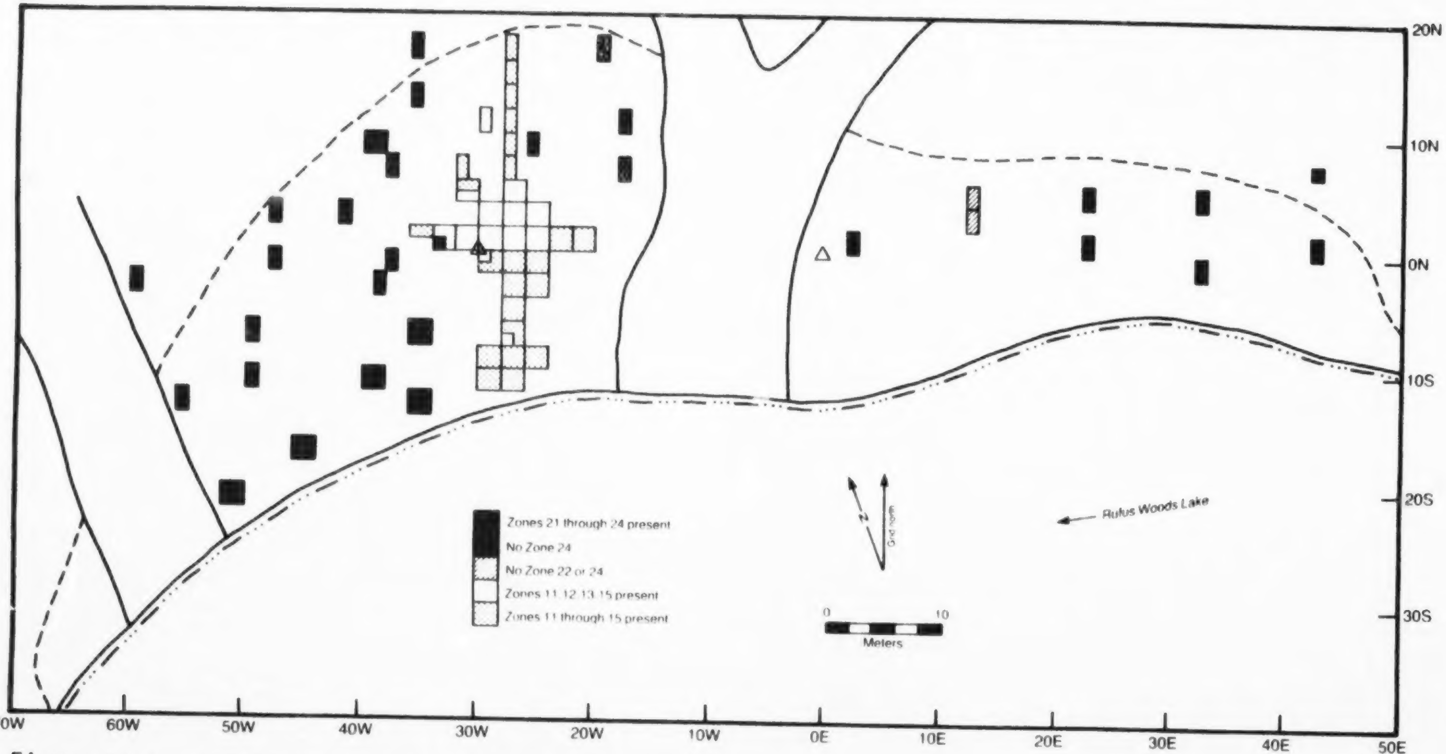

20N
10N
0N
10S
20S
30S
70W
60W
50W
40W
30W
20W
10W
0E
10E
20E
30E
40E
50E
Zones 21 through 24 present
No Zone 24
No Zone 22 or 24
Zones 11 12 13 15 present
Zones 11 through 15 present
N
Grid north
0
10
Meters
Rufus Woods Lake

Figure 2-14. Horizontal extent of zones, 45-OK-250.

Housepit Area (Area 1)

Zone 15 includes cultural materials associated with the basal alluvial cobbles and sands of Stratum 300 and with the sands and silts of the overbank Strata 200, 220, 250, and 210 of DU II. We were unable to excavate to the cobbles in all instances because of the hazards of excavating that deeply in loose sediments. The cultural material in DU II is generally sparse with little evidence of stable surfaces. The DU II strata pinch out at the northern end of the trench at approximately 15N so that DU III overlies DU I beyond this point.

Six cultural features were recorded in Zone 15; Feature 111, a shell lens on the contact between DU II and DU III in the 8S block area; Feature 81, a bone concentration resting on the cobbles of Stratum 300 at the extreme north end of the 28W trench; Features 103, 107 and 128, separately excavated lenses of orange to red oxidized matrix; and Feature 120, a carbon stained layer located just above the cobbles in 4S28W. The density of cultural material is the lowest in the housepit series of zones despite excavation of matrix volume exceeding all of the other zones. We attribute a radiocarbon date of 4448±123 B.P. (B-4336) at the top of DU II to this zone despite its recorded provenience from Feature 7, the Housepit 1 floor. The incompatibility of the age with other radiocarbon dates from the feature led us to re-examine its context. The sample was recovered from a location on the Housepit 1 floor (Feature 7) adjacent to an area recognized during excavation as possibly disturbed, and excavated separately. We suspect the disturbed area (Feature 78) represents an earlier use of the site, possibly the remnant of a structure removed for the most part by the later construction of Housepit 1. Feature 7 and Feature 78 were so closely superimposed at the location of the carbon sample that the sample is more readily attributed to the latter. The field data and stratigraphic profiles lead us to suggest association with the earlier DU II deposits and most probably with the Feature 111 shell concentration found in a similar stratigraphic position.

On the basis of this date and the estimated age of the zones above, we attribute Zone 15 to a period prior to 3800 B.P.

Zone 14 includes a peak of cultural material associated with Strata 125, 126, 170 and 225. These strata occur beneath the cultural strata of Zone 13 and were removed by the construction of Housepit 1. We also suspect that the northern 28W trench encountered the edge of a second housepit, Housepit 2, that was not recognized in the field. In this area, Stratum 125 also was removed by construction. Only two features were recorded for this zone: Feature 113, charcoal stained matrix with increased amounts of cultural material and Feature 127, a layer of bone and FMR. Feature 113 was inconsistently excavated in the northern trench so that at times it represented the second possible housepit floor and at other times a cultural layer within Stratum 125. Although the volume of Zone 14 is the lowest among this series of zones, the density of cultural material is the third greatest. No radiocarbon dates were obtained. We estimate its age as approximately 3500 to 3800 B.P. on the basis of projectile point styles and a radiocarbon date from stratigraphically analogous Zone 23 of 3349±89 B.P. (B-4335).

Zone 13 includes cultural Strata 150 and 160, representing Housepit 1 and southern debris concentrations, and Stratum 110, representing the contemporary non-housepit occupation. Zone 13 also includes Housepit 2, found in the trench north of Housepit 1. Strata 100 and 105, distinctive aeolian sediments found as fill in Housepit 1, also were included in this zone. This readily recognizable matrix, defined in the field as Features 6 and 18, was accompanied by a sharp decrease in cultural content. The fill appears to have been deposited rapidly, sealing the Housepit 1 floor and southern debris concentrations. A similar matrix was also recognized as fill in the profiles of Housepit 2.

Thirty cultural features were recorded in Zone 13, associated primarily with the Housepit 1 floor and rim and the major southern debris layers. They include concentrations of cultural material, structural features, hearths and pits. During excavation, the southern debris layers were thought to be evidence of another structure. Further examination of stratigraphic profiles and analysis of cultural material suggests the layers are the product of successive dumping episodes, most likely from the Housepit 1 area. Evidence for this interpretation is found in the stratified appearance of the cultural deposits and the apparent reversal of two stratigraphically distinct radiocarbon dates. A date of 3143±85 B.P. (B-4343) from Feature 132, a surface hearth, comes from beneath Feature 95, a debris layer with a date of 3323±105 B.P. (B-4340). The initial confusion about the southern debris layer resulted from a large pit which truncates the debris layers and natural strata giving the appearance of a structure rim. The pit appears in profiles from 6.5 to 8.5S on the 28W wall. However, when we examine the opposite 26W wall, the cultural strata are continuous and the natural strata are not truncated. The kinds and densities of materials in this area also contrast sharply with those from Housepit 1.

Finally, our analysis of the Housepit 1 features suggests more than one occupation of the structure. There are the suggestions of rim remnants, older floor fragments, and the earlier occupation discussed in Zone 15, as well as a significant range in radiocarbon dates. Of the eight radiocarbon dates obtained from this zone, three are associated with Housepit 1: 2989±76 B.P. (B-4336) from Feature 102, a possible post mold; 3219±95 B.P. (B-4341) from Feature 7, the housepit floor, and 3453±97 (B-4342) from Feature 125, a charcoal stained area on the northwest rim of the Housepit. We suspect this last feature is a slightly older structural remnant or occupation surface. A generous estimate of the age of Housepit 1 based on the first two dates above and a single standard deviation is from 2900 to 3300 B.P. Adding the other radiocarbon dates we expand our age estimate of the zone to 2800 to 3500 B.P.

Zone 12 was defined to include cultural materials from Strata 100, 102, 75, 105 and 100. The materials represent occupation above the sealed housepit and southern debris layers. A peak in material frequencies was traced in units that did not contain the distinctive aeolian sediments. Seven cultural features consisting of various debris concentations were defined for the zone. Feature 92 is a cultural layer (Stratum 102) in the south block area. Feature 136 is the large pit in 6S28W which truncates the cultural strata of the Zone 13 refuse accumulation. No radiocarbon dates were obtained from the zone. Projectile point styles are very similar to those of Zone 13, suggesting rapid fill deposition followed by re-occupation. Projectile point styles and stratigraphic position support a post-2800 B.P. age for the zone. The estimated age of the succeeding zone provides a bracketing upper age estimate of 1500 B.P.

A peak of cultural material associated with Stratum 50 comprises Zone 11. Cultural features are limited to an FMR concentration and an FMR and shell concentration. Density of cultural material is second only to that of Zone 15. No radiocarbon dates were obtained. On the basis of projectile point styles in this and the corresponding non-housepit series of zones, we estimate the age of the zone as 1500 B.P. to 1000 B.P. There is no evidence of early historic occupation, although recent historic material, primarily related to stock raising and recreational activities, was found.

Non-Housepit Area (Area 2)

The depositional and cultural material associations of these zones is shown in Table 2-3. Essentially, the four zones correspond to those of the first series. The major difference results from our inability to consistently discern two cultural peaks in DU IV that would correspond to Zones 13 and 12. Two peaks were sometimes found in DU IV associated with Stratum 110, but often there was only one. The aeolian layer separating the housepit floors from intervening later occupations does not occur in this series. The sequence of projectile points, the kind of matrix and the stratigraphic position supports the correlation of Zone 22 and Zone 13. Similarly, we correlate Zone 21 with Zone 11 and 12, Zone 23 with Zone 14 and Zone 24 with Zone 15.

ZONES, 45-OK-4

The definition of zones at 45-OK-4 is less precise than at 45-OK-250 because of the lesser resolution of the stratigraphic analysis. Thus definitions of the zones relied more heavily on peaks in cultural material and field designated features than on strata associations. Two sets of zones were developed; Zones 31 through 33 apply to Area 3, Zones 41 through 43 apply to Area 4 (Figure 2-15). The relation of the zones to stratigraphic deposits, radiocarbon dates, and cultural deposits are presented in Table 2-4.

Area 3

Zone 33 includes cultural material from DUs I and II and Strata 220, 250 and 300. The density of cultural materials is the lowest among the Area 3 series of zones. No cultural features were identified. No radiocarbon dates and few projectile points were obtained. Data from the suceeding zone suggest this cultural component pre-dates 3200 B.P. Suggestion for early site use comes from a small collection of carbonate coated artifacts associated with charcoal-stained matrix 250 to 270 cm b.u.d in 9S29E.

Zone 32 includes cultural strata representing structures and contemporary deposits (Strata 60, 71, 99, 104, 105, 110, 150, 160). It also includes a dense occupation just above the occupation floor of Housepit 5 (Stratum 149). This zone has the greatest density of cultural material in Area 3. Cultural features include evidence of at least four structures, only one of which was accompanied by a surface depression. The remaining features include a variety of debris concentrations and pits. Six radiocarbon age determinations date the zone between 3200 and 2000 B.P.

Zone 31 includes a peak of cultural material associated with DU V, IV, Stratum 50 and portions of the fill of the structures associated with an upper component (Strata 70, 75, 102, 103, 100, 98). In some units it includes two peaks in cultural material. A firepit and a shell-filled depression were the identifiable features from the zone. A single radiocarbon date of 670±63 B.P. (TX-4750) and projectile point styles support a post 2000 B.P. date for the Zone.

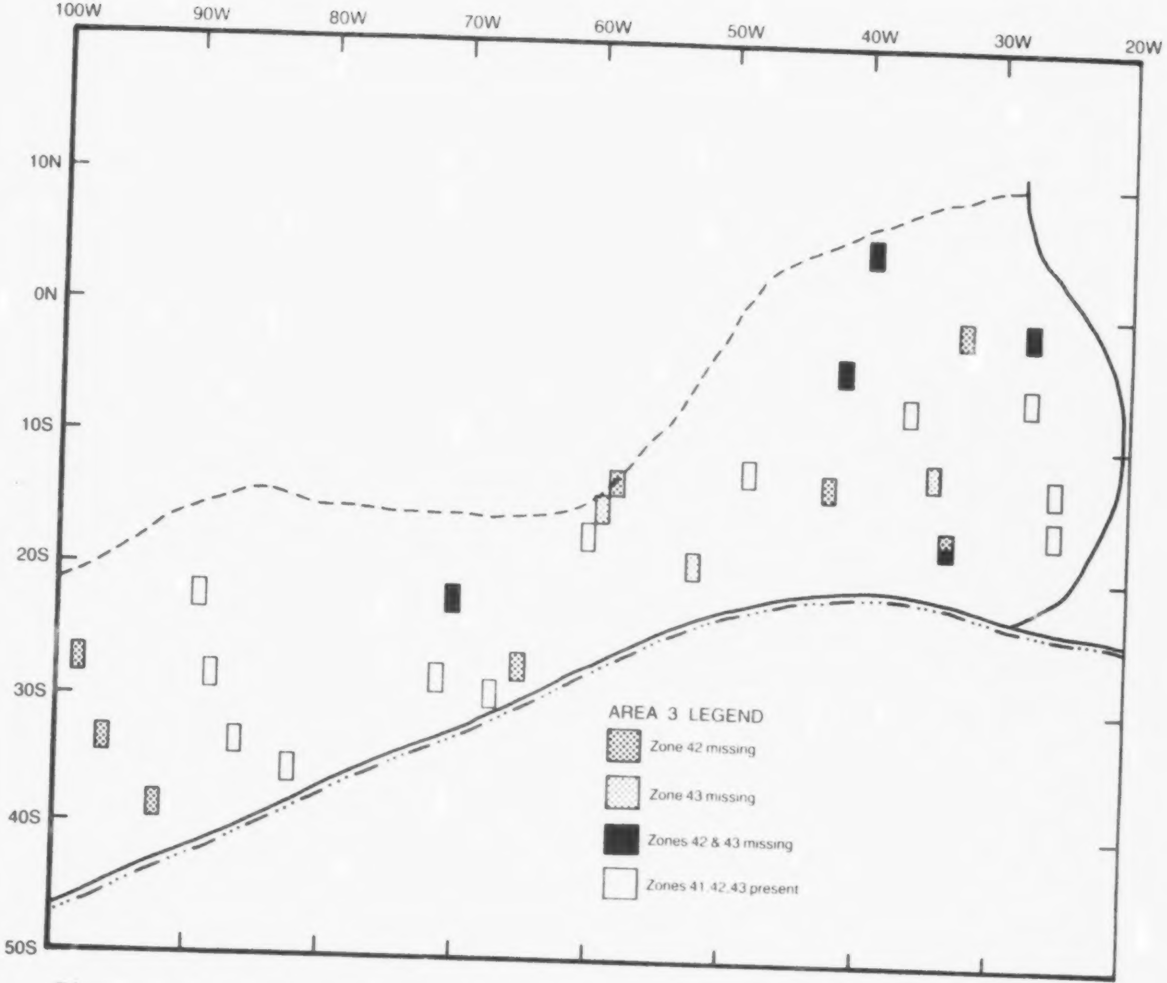

100W
90W
80W
70W
60W
50W
40W
30W
20W
10N
0N
10S
20S
30S
40S
50S
AREA 3 LEGEND
Zone 42 missing
Zone 43 missing
Zones 42 & 43 missing
Zones 41 42 43 present

Figure 2-15. Horizontal extent of zones, 45-OK-4 (Area 4).

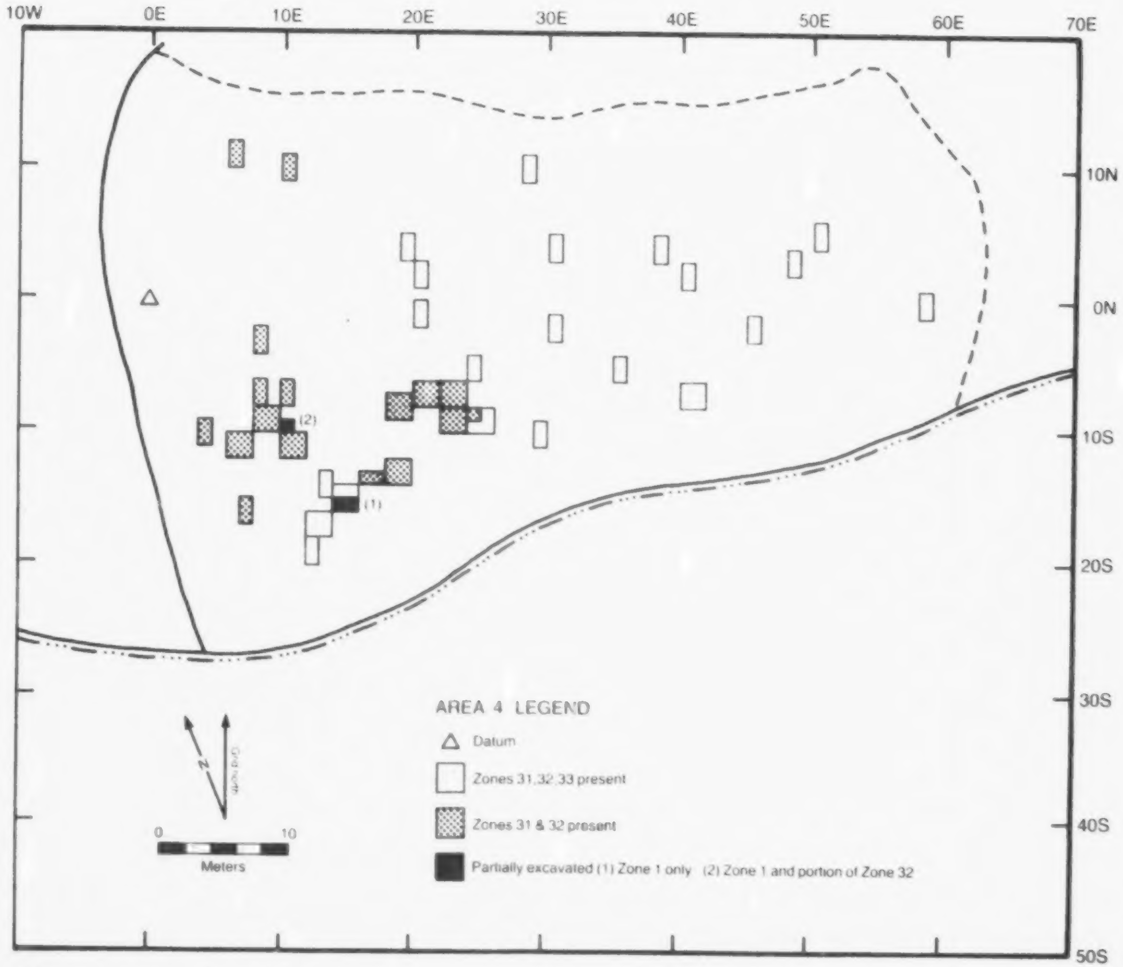

10W
0E
10E
20E
30E
40E
50E
60E
70E
10N
0N
10S
20S
30S
40S
50S
(1)
(2)
Grid north
N
0
10
Meters
AREA 4 LEGEND
△ Datum
Zones 31,32,33 present
Zones 31 & 32 present
Partially excavated (1) Zone 1 only (2) Zone 1 and portion of Zone 32

Figure 2-15. Cont'd (Area 3).

Table 2-4. Analytic zones of 45-OK-4; their stratigraphic definition, radiocarbon dates and contents.

Zone	DU	Strata	Description	Radiocarbon[1] Dates B.P.	Lithics N	Modified Non-Lithics N	Bone N gms	Shell[2] N gms	FMR N gms	Total Artifacts	Features N	Volume m³	Density Objects/m
		Area 3											
31	V, IV	50a, 75a, 70, 98, 100a, 102a, 103a	Aeolian and slope wash	670±63	4,311	11	17,945 3,601	5,066	1,588 210,043	28,921	-	71.0	407.3
32	IV, III	70, 71, 89, 104, 110, 149 150, 160	Slope wash and alluvial fan	2097 ± 132 2438 ± 145 2825 ± 86 2845 ± 121 3180 ± 50 3085 ± 110	10,770	63	148,249 34,505	11,687	3,867 557,810	174,636	-	78.2	2,233.2
33	II, I	220, 250 300	Overbank, basal gravels	-	722	2	5,886 1,505	1,222	56 11,436	7,888	-	21.5	357.6
	Total				15,803	76	171,880	17,975	5,511	211,245	-	170.7	
		Area 4											
41	V, IV	N/A	Aeolian and slope wash	-	1,218	9	4,908 868	1,160	380 124,629	7,675	-	42.2	181.9
42	III	60, 400	Slope wash and alluvial fan	2885 ± 94 2360 ± 134	1,319	6	26,624 6,060	6,758	853 189,258	35,560	-	15.0	2,370.7
43	III	N/A	Slope wash and alluvial fan	3830 ± 113	266	2	4,370 1,306	2,510	50 10,829	7,206	-	15.7	459.0
	Total				2,803	17	35,910	10,428	1,283	50,441	-	72.9	

[1] See Appendix A

[2] Shell weights not recorded

Area 4

Cultural materials associated with DU III make up Zone 43. The material generally rests on the basal colluvial deposits of DU I or represents a peak in cultural material within DU III. Two features, an occupation surface and a shell concentration, were identified. A single radiocarbon date of 3630±113 B.P. (TX-4832) allows us to estimate the age of these deposits as prior to 3500 B.P.

Cultural material associated with Stratum 400, a cultural layer, have been included in Zone 42 as well as a first peak in cultural material in DU III. Features include debris concentrations, occupation surfaces, a pit, and a small structure. Two radiocarbon dates 2895±94and 2360±134 B.P., projectile point styles and the age of the preceding zone allow us to date the zone from 3500 B.P to 2000 B.P.

Zone 41 includes cultural material associated with DU's IV and V. Two cultural features, a firepit and a shell scatter, were found. No radiocarbon dates were obtained. The few projectile points and stratigraphic position support a post-2000 B.P. date for the zone.

CORRELATIONS

To discuss 45-OK-250 and 45-OK-4 together we must use the more general zone scheme for the latter site. The zonal assignments at 45-OK-4 in a sense violate the concept of the analytic zone as the smallest discrete unit of site-wide analysis. Zones 31 and 32 contain more than one peak in cultural material. Time limitations prevented us from more precisely isolating these cultural episodes.

We have defined a third set of three zones which incorporate materials at both sites. These zones are designated 51, 52, and 53. Figure 2-16 shows the temporal relationship-- based on radiocarbon dates, stratigraphic context and some information from projectile point styles-- of the zones at each site and the combined zones. The correlation is intended to isolate the Hudnut component represented by Zone 52 at each site. We have included Zone 12 in Zone 51 at 45-OK-250 because of its stratigraphic similarity to the second peak in cultural material associated with Zone 31 at 45-OK-4 and because the lower age estimate of the zone relies on the dating of Zone 13. Further, this grouping isolates cultural material in Zone 52 at 45-OK-250 representing the early portion of the Hudnut Phase. Zones 32 and 42 at 45-OK-4 have been combined as representative of the mid- and later Hudnut Phase. Zones 15, 24, and 33 are all associated with the same depositional unit. Zone 43 is included within them to again isolate the Hudnut component.

In summary, the earliest zones at each site are roughly contemporaneous, representing early Hudnut and Later Kartar site use. The 52 zones provide strong Hudnut Phase components which may be usefully compared to other sites in the project area. Further chronological refinement within the phase is also possible by isolating and comparing dated features. The 51 zones are not as secure in their chronological assignment but broadly approximate late Hudnut and Coyote Creek Phase components.

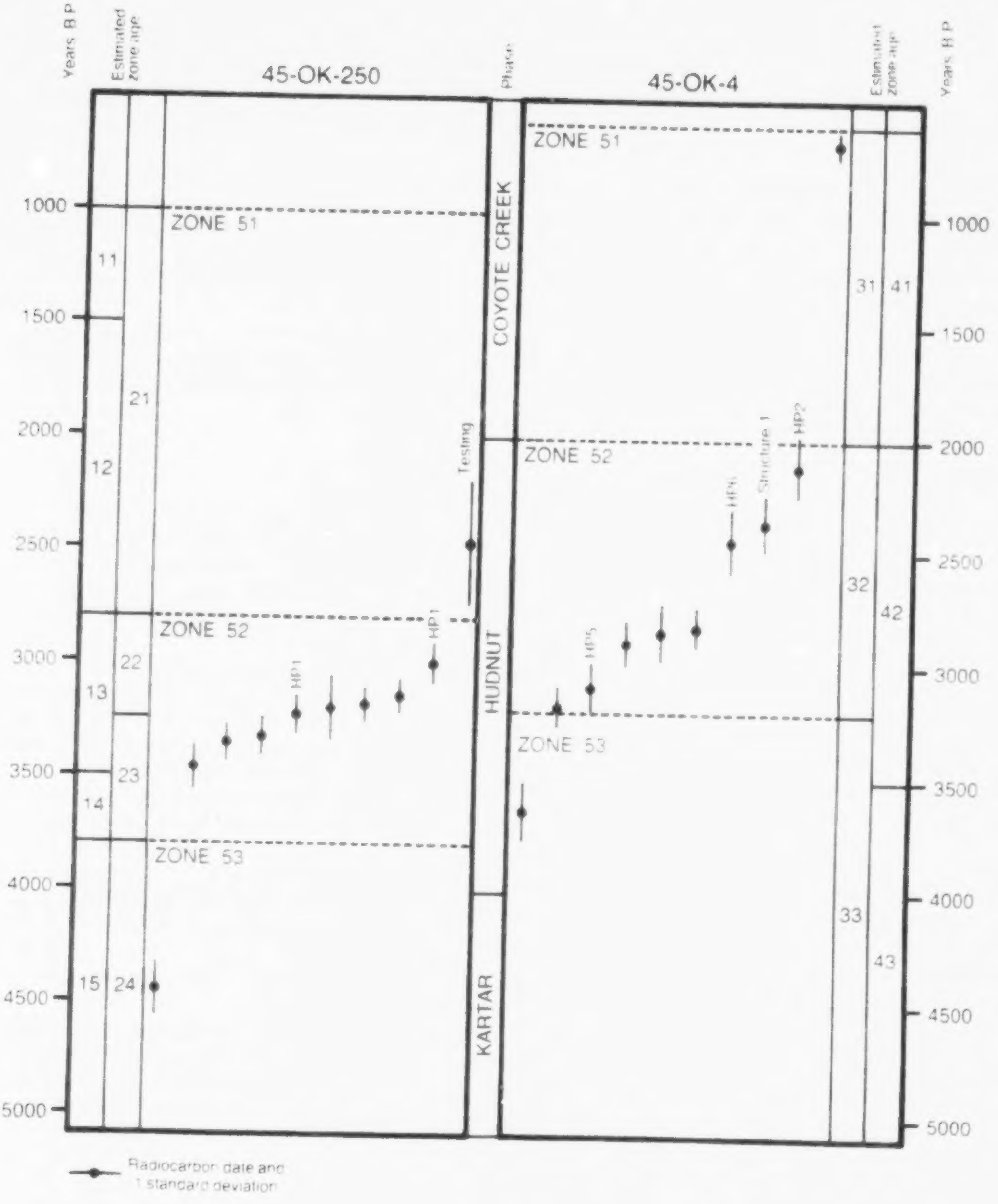


Figure 2-16. Correlation of analytic zones, 45-OK-250 and 45-OK-4. See Table A-1 for additional information on radiocarbon dates.

3. ARTIFACT ANALYSES

This chapter presents analyses of lithic and nonlithic items modified by use and/or manufacture. Of the 626,713 objects from 45-OK-250 and 45-OK-4, 36,891 were worn or modified, most representing the by-products of manufacture (Tables 2-2 and 2-3). The remainder of the assemblage is distributed among the categories of bone, shell and fire-modified rock (FMR). The analysis of identifiable bone is presented in Chapter 4. The weights and numbers of unidentified bone, shell, and FMR were recorded by collection unit. Shell weights were not recorded for 45-OK-4.

The worn/manufactured artifacts have been categorized on the basis of morphological, technological and functional attributes. Traditionally used descriptors, such as drill, graver and burin, have been used to name the objects to allow comparison among the zones and with other sites in the project area and the region (Table 3-1). Since these names imply uses which may or may not be accurate attributions, their definitions are evaluated in the functional analysis section of this chapter.

The lithic objects described below have been subjected to several analyses. The technological analysis focuses on the use of lithic resources, describing the raw materials and the by-products of manufacture allowing us to infer the methods used to fashion stone implements. The functional analysis examines how lithic artifacts were modified by manufacture and use, thus providing evidence about activities at the site. The cobble-derived artifacts in the assemblage were subjected to an additional analysis combining both morphological and functional elements. The analysis was developed to more adequately describe and interpret the extensive cobble tool portion of the 45-OK-11 lithic assemblage. The results of the 45-OK-250/4 analysis are presented to allow comparison to 45-OK-11 and 45-OK-258 (Lohse 1984f; Jaehnig 1983b). A fourth analysis describes bone and shell which show evidence of use and/or modification. The final section analyzes projectile point styles which are classified by morphological and historical types. Additional details on methods and procedures used in these analyses at the Chief Joseph Dam Project are presented in the research design (Campbell 1984d).

TECHNOLOGICAL ANALYSIS

The technological analysis is composed of five dimensions: object type, material type, presence or absence of cortex, degree of breakage, and evidence of burning or dehydration. The variables of each dimension, and data tabulations are presented in Appendix B.

Table 3-1. Formal lithic object types by zone, 45-OK-250 and 45-OK-4 (see Table B-1, Appendix B for breakdown by finer zones).

Object Type	Zone 51		Zone 52		Zone 53		Total[1]	
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4
Formed Object								
Projectile Point	26	33	41	45	1	7	68	85
Base	14	7	12	11	3	1	29	19
Tip	13	13	16	23	2	2	31	38
Biface	43	36	72	61	2	7	117	104
Drill	3	5	12	4	1	-	16	9
Graver	1	7	5	6	-	1	6	14
Scraper	9	6	13	8	-	2	22	16
Tabular Knife	91	51	105	148	8	6	204	205
Chopper	6	6	10	7	-	3	16	16
Adze	-	-	-	2	-	-	-	2
Maul	1	-	-	-	-	-	1	-
Pestle	1	-	2	-	-	-	3	-
Bead	2	1	13	12	-	4	15	17
Subtotal	210	165	301	327	17	33	528	525
Worn/Modified Objects								
Amorphously flaked cobble	-	-	1	1	1	-	2	1
Edge-ground cobble	1	-	-	-	-	-	1	-
Anvil	2	1	1	-	1	-	4	1
Milling Stone	4	-	20	6	1	-	25	6
Hopper mortar base	-	1	-	3	-	-	-	4
Hammerstone	11	3	24	31	-	1	35	35
Shaped/incised silt-stone	22	-	17	2	-	-	39	2
Subtotal	40	5	63	43	3	1	106	49
Cores and Specialized/Modified/Worn Flakes								
Core	1	-	7	10	-	2	8	12
Burin	-	-	-	1	-	-	-	1
Burin spall	-	-	-	1	-	-	-	1
Blade	1	-	-	-	-	-	1	-
Linear flake	4	5	3	4	-	-	7	9
Resharpened flake	24	1	22	3	1	-	47	4
Bifacially retouched flake	37	8	40	10	6	2	83	20
Unifacially retouched flake	49	18	64	29	5	2	118	49
Utilized flake	115	59	194	74	114	9	320	142
Subtotal	231	91	330	132	23	15	584	238
Indeterminate	3	12	6	18	1	2	10	32
Other fragments	-	-	2	-	-	-	2	-
Subtotal	3	12	8	18	1	2	12	32
Unworn Debitage								
Conchoidal flake	4,467	3,928	7,311	8,264	398	692	12,176	12,884
Tabular flake	1,124	1,056	1,664	2,850	108	226	2,896	4,132
Chunk	535	276	901	483	54	25	1,490	784
Weathered	11	-	10	-	1	-	22	-
Indeterminate/missing	-	-	6	1	4	-	10	1
Subtotal	6,137	5,260	9,892	11,598	565	943	16,594	17,801
Total	6,621	5,521	10,595	12,092	609	992	17,824	18,645

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[1] Does not include <1/4" flakes.

Jasper, chalcedony, petrified wood and opal, the cryptocrystalline silicas (CCS), make up over 70% of the site assemblages and are the most common materials in each zone (Table 3-2). Quartzite, including fine- and coarse-grained forms, is the next most frequent material. Basalts, obsidian, siliceous mudstone, granite, sandstone, nephrite, silt/mudstone, schist and other materials make up the remainder of the assemblage.

There are some contrasts in material frequencies between the sites and among the zones. The proportion of jasper is similar among the zones at both sites; however, it is a consistently smaller proportion of the 45-OK-4 assemblage. Opal is the most frequent material in all of the zones. In Zone 53 at 45-OK-4, its proportion (28.1%) drops sharply and the difference appears to be made up by fine-grained basalt (24.1%). Fine-grained basalt in general is more common at 45-OK-4. Tracing the contributions of the site zones to the more generalized accounting presented here, we find that 31.0% (N=726) of the artifacts in Zone 33 at 45-OK-4 are of fine-grained basalt (Table B-2, Appendix B).

We can seek explanation for these contrasts in a number of factors, which we will trace through both the technological and functional analyses. They may result from material availability, cultural preference or functional requirements of activities represented in the zones at each site. In the case of fine-grained basalt, we may be observing the effects of a much smaller sample size in the oldest zone at 45-OK-4.

Jasper, chalcedony and opal are cryptocrystalline silicas formed by similar processes. They are available at a moderate distance from the site in the escarpments of the Columbia River valley's rim. Quartzites and basalts are available on site from river gravels. Despite low frequencies, (Appendix B, Table B-2) argillite, obsidian, petrified wood and possibly nephrite are noteworthy because they are materials with no major local source (Hibbert 1984), although there may be rare occurences in river or glacial outwash gravels. Most of the remaining materials are locally available.

Jasper, chalcedony, petrified wood and, to some extent, opal all have similar physical properties. Their elasticity and homogeneity cause them to flake in a predictable conchoidal manner. Because of these similarities, they will be considered as a single group. Much of the quartzite found in the project area tends to break along bedding planes, producing tabular rather than conchoidal flakes. The fine-grained form has some tendency to fracture conchoidally, but its flaking is less predictable and less controllable than that of CCS. Coarse-grained basalts are similar to the coarse-grained quartzites in that both produce unpredictable fractures. In its fine-grained form, basalt flakes much like CCS. Elsewhere on the Plateau, a reliance on fine-grained basalts to manufacture projectile points and other finely crafted implements is characteristic of early cultural phases (e.g., Leonhardy and Rice 1970).

Two parallel systems of lithic production based on material type and the physical characteristics described above apparently were used at 45-OK-250/4. Cores, specialized flakes, debitage, and, to some extent, the formed objects, provide information about these systems.

Table 3-2. Lithic material types by zone, 45-OK-250 and 45-OK-4.

Material Type		Zone 51		Zone 52		Zone 53		Total[1]
		45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	
Jasper	N	1,783	736	2,514	11,56	156	117	6,462
	%	27.0	13.3	23.8	9.5	25.7	11.8	17.7
Chalcedony	N	701	455	911	655	55	69	2,846
	%	10.6	8.2	8.6	5.4	9.1	6.9	7.8
Petrified wood	N	10	17	9	31	-	3	70
	%	0.2	0.3	<0.1	0.3		0.3	0.2
Opal	N	2,615	2,613	4,941	5,982	243	279	16,673
	%	39.6	47.2	46.8	49.4	40.0	28.1	45.8
Obsidian	N	7	7	9	7	2	-	32
	%	0.1	0.1	<0.1	<0.1	0.3		<0.1
Argillite	N	25	-	11	-	-	-	36
	%	0.4		0.1				0.1
Quartzite	N	1,314	1,201	1,941	3,123	129	247	7,955
	%	19.9	21.7	18.4	25.8	21.3	24.8	21.8
Fine-grained quartzite	N	11	31	15	45	-	6	108
	%	0.2	0.6	0.7	0.4		0.6	0.3
Basalt	N	55	55	79	161	8	23	381
	%	0.8	1.0	0.7	1.3	1.3	2.3	1.0
Fine-grained basalt	N	21	327	35	785	5	240	1,413
	%	0.3	5.9	0.3	6.5	0.8	24.1	3.9
Silicized mudstone	N	14	72	13	78	2	3	182
	%	0.2	1.3	0.1	0.6	0.3	0.3	0.5
Granitic	N	18	11	38	45	3	1	116
	%	0.3	0.2	0.4	0.4	0.5	0.1	0.3
Sandstone	N	1	-	1	-	-	-	2
	%	<0.1		<0.1				<0.1
Nephrite	N	1	-	1	1	-	-	3
	%	<0.1		<0.1	<0.1			<0.1
Siltstone/ mudstone	N	22	-	18	2	-	-	42
	%	0.3		<0.1	<0.1			0.1
Steatite	N	-	-	-	1	-	-	1
	%				<0.1			<0.1
Schist	N	-	1	-	5	-	-	6
	%		<0.1		<0.1			<0.1
Shale	N	-	1	1	9	-	-	11
	%		<0.1	<0.1	<0.1			<0.1
Quartz	N	-	-	2	2	-	-	4
	%			<0.1	<0.1			<0.1
Graphite/ molybdenite	N	-	1	1	-	-	-	2
	%		<0.1	<0.1				<0.1
Very fine-grained red sandstone	N	-	1	1	1	-	-	3
	%		<0.1	<0.1	<0.1			<0.1
Indeterminate	N	9	4	19	29	4	6	71
	%	0.1	0.1	0.2	0.2	0.7	0.6	0.2
Total	N	6,607	5,533	10,560	12,118	607	994	36,419

[1] Does not include <1/4" flakes.

The first system consists of the bifacial reduction of materials with pronounced, predictable conchoidal flaking characteristics. Sequential stage models have been developed elsewhere to describe this process of manufacture (Holmes 1919; Sharrock 1966; Muto 1971; Womack 1977; Callahan 1979). Basically, they involve the same process: the acquisition of raw materials and their reduction into increasingly refined bifacial forms until the desired product is reached. Each stage of the model has characteristic products and by-products (Figure 3-1). Primary flakes show weathered or rind surfaces of the original exterior on all or portions of their dorsal surfaces. Secondary flakes lack cortex and dorsally show only scars of previously detached flakes. Predictably, cores discarded earlier in the sequence exhibit cortex while those discarded later do not. Flakes removed toward the latter portion of the sequence as bifaces are formed have a diagnostic appearance: the dorsal surface retains the scars from earlier secondary flake detachment, the ventral surface is smooth, and the striking platform retains a portion of the biface edge. In the final stages of manufacture, small, thin flakes are removed by the pressure technique and the desired tool is formed.

The second system of reduction is similar to the first except that large flakes from locally available cobbles and the modified cobbles themselves are the desired products. Since it represents an "indulgent" system based on readily available resources (MacDonald 1971), extensive modification and reuse of the products in this system is less likely to occur.

During any stage of either system, the products of reduction may be modified and used, put directly to use, or discarded. Discarded items can re-enter the main sequence resulting in the production of smaller waste flakes indistinguishable from other by-products. When worn lithics are rejuvenated, characteristic flakes, retaining the wear removed from the parent object, are produced. In both systems, debitage tends to decrease in size and increase in number at each successive stage of reduction.

Various formal categories used to classify the 45-OK-250 and 45-OK-4 assemblages demonstrate these systems. Cores, bifaces, primary flakes and secondary flakes are categories in the project classification. Preforms are classified as Type 2 in the project stylistic analysis of projectile points. Linear flakes, manufactured by pressure flaking, represent final reduction. In the project system, the classification "resharpening flakes" includes bifacial thinning flakes and flakes from tool rejuvenation. Bifacially and unifacially retouched flakes and utilized flakes are by-products of the sequence that have been modified and/or used.

Artifact assemblages of each major material type are evidence of the use of both systems to produce the implements of prehistoric subsistence at 45-OK-250 and 45-OK-4. In the discussion below reference may be made to Tables 3-3 through 3-6 for artifacts sorted by material type and zone. Percent of primary flakes and relative frequencies of kinds of debitage are presented in Figure 3-2 and Table 3-7. Additional zone information and sample sizes are available in Table B-3 through B-6, Appendix B.

Products of the bifacial reduction system are easily recognized in the CCS assemblage (Table 3-3). In addition to the formed objects such as projectile points and bifaces, cores and all the specialized flake types occur

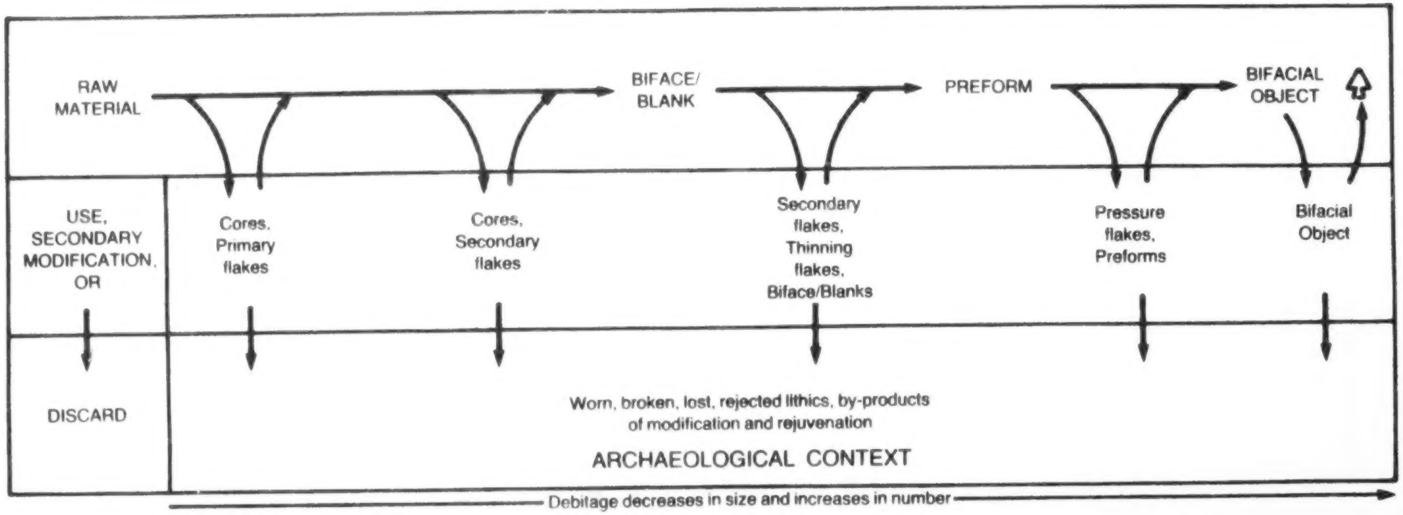
RAW MATERIAL
BIFACE/ BLANK
PREFORM
BIFACIAL OBJECT
USE, SECONDARY MODIFICATION, OR
Cores, Primary flakes
Cores, Secondary flakes
Secondary flakes, Thinning flakes, Biface/Blanks
Pressure flakes, Preforms
Bifacial Object
DISCARD
Worn, broken, lost, rejected lithics, by-products of modification and rejuvenation
ARCHAEOLOGICAL CONTEXT
Debitage decreases in size and increases in number

Figure 3-1. Schematic of the bifacial reduction process.

Table 3-3. Cryptocrystalline artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type	Zone 51		Zone 52		Zone 53		Total[1]
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	
Formed Object							
Projectile Point	25	26	38	38	1	5	133
Base	12	4	11	6	3	1	37
Tip	12	11	16	22	2	2	65
Biface	42	30	71	54	2	4	203
Drill	3	5	12	4	1	1	26
Graver	1	7	5	6	–	1	20
Scraper	9	6	12	8	–	–	35
Bead	–	–	1	–	–	–	1
Subtotal	104	89	166	138	9	14	520
Cores and Specialized/Modified/Worn Flakes							
Core	1	–	7	10	–	2	20
Burin	–	–	–	1	–	–	1
Burin spall	–	–	–	1	–	–	1
Blade	1	–	–	–	–	–	1
Linear flake	4	5	3	4	–	–	16
Resharpened flake	23	1	22	3	1	–	50
Bifacially retouched flake	36	7	39	9	6	2	99
Unifacially retouched flake	49	17	63	28	5	2	164
Utilized flake	114	53	190	66	10	5	438
Subtotal	228	83	324	122	22	11	889
Indeterminate	–	1	2	2	–	–	5
Other fragments	–	–	1	–	–	–	1
Subtotal	–	1	3	2	–	–	6
Total	332	173	493	262	31	25	1,316

[1] Does not include <1/4" flakes.

Table 3-4. Quartzite artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type	Zone 51		Zone 52		Zone 53		Total
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	
Formed Object							
Biface	–	–	–	1[1]	–	–	1
Scraper	–	–	–	–	–	1[1]	1
Tabular knife	91	51	105	147	8	6	408
Chopper	1/1[1]	5	3	3/1[1]	–	1	15
Subtotal	93	56	108	152	8	8	425
Worn/Modified Objects							
Amorphously flaked cobble	–	–	–	–	1	–	1
Milling stone	–	–	1	–	–	–	1
Hammerstone	1[1]	2	1/2[1]	7	–	–	13
Subtotal	1	2	4	7	1	–	15
Cores and Specialized/Modified/Worn Flakes							
Resharpened flake	1	–	–	–	–	–	1
Bifacially retouched flake	1[1]	–	–	–	–	–	1
Unifacially retouched flake	–	–	–	1[1]	–	–	1
Utilized flake	–	–	2	–	–	1[1]	3
Subtotal	2	–	2	1	–	1	6
Indeterminate	–	3	–	2	–	2	7
Other fragments	–	–	1	–	–	–	1
Subtotal	–	3	1	2	–	–	8
Total	96	61	115	162	9	11	454

[1] Fine-grained

Table 3-5. Basalt artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type	Zone 51		Zone 52		Zone 53		Total
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	
Formed Object							
Projectile Point	1	5	1	7	–	1	15
Base	2	3	1	4	–	–	10
Tip	–	1	–	1	–	–	2
Biface	1	6	–	5	–	2	14
Scraper	–	–	1	–	–	–	1
Chopper	3	–	7	3	–	2	15
Maul	1	–	–	–	–	–	1
Pestle	1	–	1	–	–	–	2
Bead	–	–	2	–	–	–	2
Subtotal	9	15	13	20	–	5	62
Worn/Modified Objects							
Amorphously flaked cobble	–	–	1	1	–	–	2
Anvil	1	–	–	–	–	–	1
Hopper mortar base	–	1	–	–	–	–	1
Millingstone	2	–	2	1	–	–	5
Hammerstone	5	–	7	7	–	–	19
Subtotal	8	1	10	9	–	–	28
Specialized/Modified/Worn Flakes							
Bifacially retouched flake	–	–	1	1	–	–	2
Unifacially retouched flake	–	1	–	–	–	–	1
Utilized flake	–	4	2	5	1	3	15
Subtotal	–	5	3	6	1	3	18
Indeterminate	1	4	1	5	–	–	11
Total	18	25	27	40	1	8	119

[1] Does not include <1/4" flakes.

Table 3-6. Artifacts of obsidian, granitic, other, and indeterminate by zone, 45-OK-250 and 45-OK-4.

Object Type	Material	Zone 51		Zone 52		Zone 53		Total
		45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	
Formed Object								
Projectile Point	Obsidian	–	1	–	–	–	–	1
	Other	–	1	2	–	–	–	3
	Indet.	–	1	2	–	–	–	3
Base	Obsidian	–	–	–	1	–	–	1
Tip	Other	–	1	–	–	–	–	1
	Indet.	1	–	–	–	–	1	
Biface	Other	–	–	1	1	–	1	3
Tabular knife	Indet.	–	–	–	1	–	–	1
Chopper	Granitic	1	1	–	–	–	–	2
Adze	Other	–	–	–	2	–	–	2
Pestle	Granitic	–	–	1	–	–	–	2
Bead	Other	–	–	1	–	–	–	1
	Indet.	2	1	6	12	3	4	28
Subtotal		5	5	11	17	3	6	47
Worn/Modified Objects								
Edge-ground cobble	Granitic	1	–	–	–	–	–	1
Anvil	Granitic	1	1	1	–	1	–	4
Milling Stone	Granitic	2	–	16	5	1	–	24
	Indet.	–	–	1	–	–	–	1
Hammerstone	Granitic	5	–	12	10	–	1	28
	Other	–	–	1	–	–	–	1
	Indet.	–	1	–	7	–	–	8
Shaped/incised siltstone	Other	22	–	12	2	5	–	41
Subtotal		31	2	43	24	7	1	108
Specialized/Modified/Worn Flakes								
Bifacially retouched flake	Other	–	1	–	–	–	–	1
Unifacially retouched flake	Other	1	–	–	–	–	–	1
Utilized flake	Obsidian	1	1	–	–	–	–	2
	Other	–	1	–	1	–	–	2
	Indet.	–	–	–	1	–	–	1
Subtotal		2	3	–	2	–	–	7
Indeterminate	Granitic	–	–	1	1	1	–	3
	Other	1	3	1	6	–	–	11
	Indet.	1	1	1	2	–	–	5
Subtotal		2	4	3	9	1	–	19
Total		40	14	57	52	11	7	181

[1] Does not include <1/4" flakes.

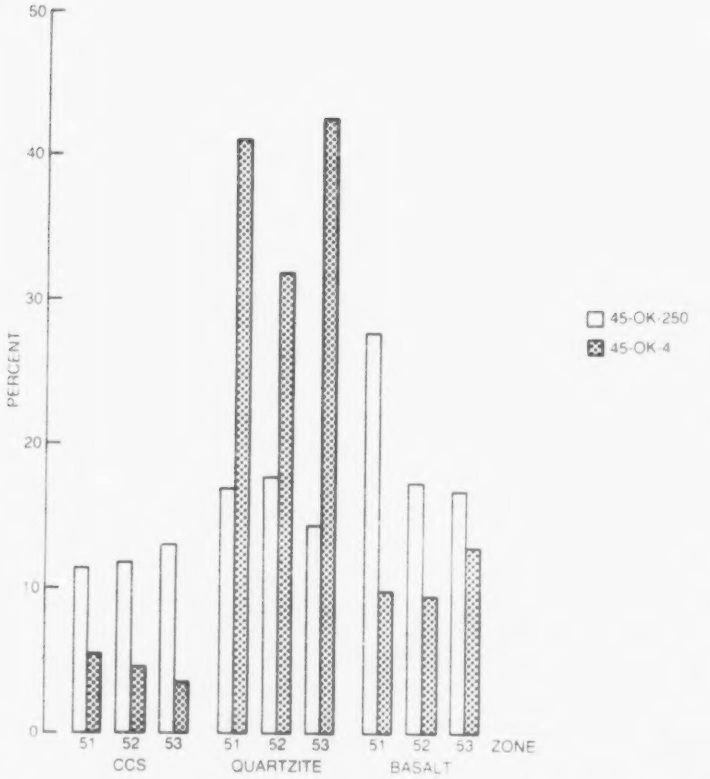

Figure 3-2. Percentage of primary debitage of major material types by zone, 45-OK-250 and 45-OK-4.

Table 3-7. Kinds of debitage by zone, 45-OK-250 and 45-OK-4 (see Table B-9, Appendix B for information by finer zones).

Material Type	Zone 51		Zone 52		Zone 53	
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4
Cryptocrystalline	N=5121	N=3821	N=8408	N=7824	N=456	N=468
Conchoidal flake	84.5%	90.4%	84.7%	92.3%	82.7%	91.2
Tabular flake	–	–	–	–	–	–
Chunk	8.9	5.0	9.4	4.3	10.3	3.4
Quartzite	N=1328	N=1232	N=1956	N=3168	N=129	N=253
Conchoidal flake	3.4%	3.0%	3.9%	1.8%	5.4%	3.6%
Tabular flake	84.8	85.6	85.0	89.0	80.6	88.9
Chunk	4.5	6.5	5.1	4.0	3.9	3.2
Basalt	N=76	N=382	N=114	N=894	N=13	N=254
Conchoidal flake	64.5%	92.4%	69.3%	94.5%	84.6%	96.6
Tabular flake	–	–	0.9	–	–	–
Chunk	11.8	1.0	8.9	1.3	7.7	0.4

in the assemblages. The CCS debitage is made up of the smallest conchoidal flakes, few of which retain cortex.

While the average flake size is similar at both sites, the proportion of CCS primary flakes is consistently less at 45-OK-4. This may be related to the previously noted smaller proportion of jasper and of chalcedony in the 45-OK-4 zone assemblages, materials more likely to have discernible cortex. Opal tends not to have weathered surfaces and its exterior is difficult to identify.

The quartzite assemblage contains a biface and conchoidal flakes, representative of the bifacial reduction system. The remainder of the collection which includes minimally modified tabular knives, choppers, modified and used flakes, cobble artifacts and tabular flakes belongs to the cobble reduction system.

The average length of the conchoidal quartzite flakes from 45-OK-4 is much greater than that at 45-OK-250. In addition, there are significantly more primary quartzite flakes in each zone at 45-OK-4. The first observation can be attributed to the small sample size of conchoidal flakes. An explanation for the second observation is less obvious. The greater frequency of cortex suggests more primary lithic reduction at 45-OK-4. However, when we examine the frequencies of objects made from this material, we find no significant differences between the sites; a desired end-product is not evident. We can suggest that flakes and spalls suitable for a variety of activities was the goal. Such objects would be easily acquired and just as easily discarded after brief use. We would expect, then, to find more utilized quartzite debitage at 45-OK-4, which is hardly evident in the small frequencies of modified flakes. The proposed brevity of use and notorious difficulty in detecting all but the most pronounced wear on quartzite provide another explanation. In any case, the high frequency of primary quartzite flakes suggests behavioral differences between the two sites and may represent localized access to quartzite slightly more advantageous at 45-OK-4 than at 45-OK-250.

Basalt shows elements of both systems; there is evidence for the bifacial system in the projectile points and fragments, biface, scraper and specialized flakes. The second system is represented by choppers and various cobble-derived implements and support stones. Debitage is very similar in size to that of CCS and contains no tabular flakes. Primary debitage is intermediate in frequency between CCS and quartzite. Primary basalt debitage appears to be more common at 45-OK-250. The sample size is a good deal smaller than that of 45-OK-4.

Data for obsidian and the remaining lithic material types have been combined in Table 3-6. The few pieces of obsidian most resemble the CCS assemblage. Artifacts of this material include a projectile point and base and two utilized flakes. The debitage is made up of 27 conchoidal flakes. The remaining materials, especially the granitics, occur primarily as percussive implements or supports.

Table B-10, Appendix B presents the condition of the lithic assemblage by zone for 45-OK-250. The percentages of complete objects do not vary greatly in the zones with large frequencies.

The final dimension of the technological analysis concerns evidence of burning. Analysis shows that intentional thermal alteration of lithic material was not practiced at 45-OK-250 or 45-OK-4. Over 99% of each site assemblage shows no sign of burning or dehydration (Appendix B, Table B-11). The remaining artifacts could easily have been affected by casual association with hearths.

FUNCTIONAL ANALYSIS

The functional analysis of lithic artifacts from 45-OK-250 and 45-OK-4 provides basic descriptive information on characteristics and modifications associated with manufacture and use. Manufacture-specific dimensions include indications of utilization and modification as well as manufacture type and its disposition. Seven dimensions are specific to each worn area on an object: condition of wear, the relationship between wear and manufacture, wear type, wear location on the object, wear area shape, wear orientation, and the edge angle at the wear location. The variables of the dimensions are presented in Appendix B, Table 12.

Various investigators have documented and described complexes of wear attrition and edge angle associated with specific functions both ethnographically and experimentally (e.g., Frison 1968; Gould and Quilter 1972; Gould et al. 1971; Hayden and Kamminga 1973; Wilmsen 1970; Wylie 1975). While it would be difficult to correlate the present analysis directly with the observations in the literature, some indication of general functions may be derived from this data. The kinds, locations and intensity of detectable wear traces are dependent on the mode of use, the material the tool is made from, the character of the tool edge, the nature of the material worked, and the presence of abrasive agents (Hayden and Kamminga 1973:6). These traces are not directly comparable as quantifications of the tasks performed because tool material types, tool forms, and functional activities all influence the number and kinds of traces resulting from use (Wylie 1975). A host of other factors, including weathering, manufacturing and rejuvenating practices, multiple use for specific tasks, recovery processes, and postrecovery accidents complicate wear detection and functional interpretation.

Just as no single wear trace is clear evidence of function, neither is edge angle alone diagnostic of a particular task. The shear and tensile strength of the tool material in relation to the force and angle of application, the artifact form, and the hardness of the material being worked are also key factors. The optimal tool edge angle is "a compromise between worked material hardness and the ability of the tool to withstand stress" (Wilmsen 1974:91). Cryptocrystallines, for example, are stronger in compression than in shear or tensile strengths. This means that forces exerted into the body of the tool are absorbed without damage if the tool is thick enough at the point of force application to transmit the developed stresses. Thus, very acute angles probably were seldom used because of the fragility of such an edge. Edges with mid-range angles can transmit forces directly into the body of the tool without excessive damage, but break easily under transversely applied loads. More obtuse angles are able to absorb shear stresses as well as compression (Wilmsen 1974:92).

Table 3-8 presents functional correlates of wear variables. In the subsequent discussion, some variables of the wear dimensions have been combined. A single category represents variables of smoothing and polishing; a second single category includes all crushing variables. All variables involving point modification also have been combined. Two categories were created by combining variations of convex and concave wear dimensions Appendix B, Table 13.

Table 3-8. Variables of wear and implied function.

General Activity	Specific Function	Materials Modified	Associated Edge Angle (degrees)	Typical Wear Traces
Scraping	Soft Scraping	Hide	50-80	Smoothing; edge and unifacial
	Hard Scraping	Wood, Bone	70-90	Hinged and feathered chipping, smoothing edge and unifacial
Cutting	Carving	Hide, Flesh Wood	30-60	Feathered chipping and smoothing; bifacial
	Sawing	Wood, Bone	20-70	
Percussion	Chopping	Wood, Bone	60-90	Hinge chipping and crushing; edge and bifacial
	Pounding	Wood, Bone Stone, Shell	N/A	Crushing, pecking, surface
Penetration	Drilling	Wood, Bone Stone, Shell	N/A	Hinged and feathered chipping, smoothing; opposing unifacial and point
	Awling	Hide	N/A	Feathered chipping, smoothing; bifacial and point
	Projectile Impact	Hide, Bone Soil, Stone	N/A	Tip burination striations Hinge fracture

[1] Adapted from Wylie 1975:Figure 2, Figure19.

In the following discussion we characterize the assemblage and highlight contrasts among the zones, particulary between Zones 51 and 52, and between the sites. Comparisons involving Zone 53 are less reliable because of the small size of the Zone 53 assemblages. Contrasts between zones in a variety of variables alert us to possible differences in site function and activities that might not be apparent from the distribution of formal object types alone.

Most of the lithic assemblages from 45-OK-250 and 45-OK-4 are unmodified debitage from the manufacturing processes. Slightly more of the 45-OK-4 assemblage is unmodified (95.6%) compared to that from 45-OK-250 (93.2%) (Table 3-1). Among the remaining artifacts, worn and worn and manufactured objects are at least twice as common as objects displaying manufacture only at both sites (Figure 3-3). We find the greatest difference between the sites in

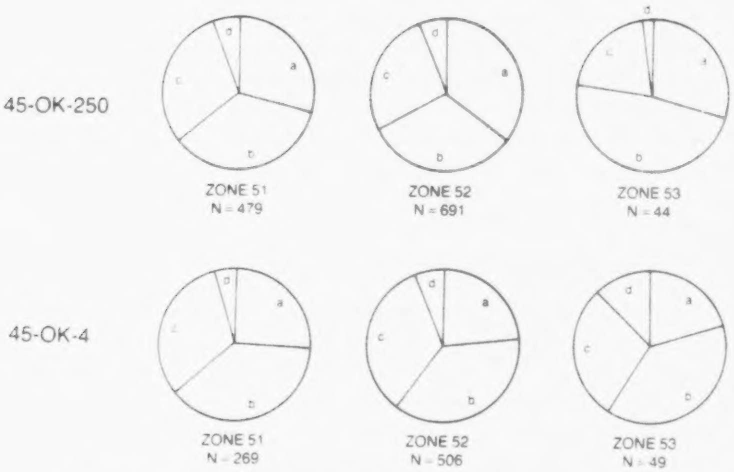

Figure 3-3. Utilization and manufacture by zone, 45-OK-250 and 45-OK-4 (based on data in Appendix B, Table B-14).
a=wear
b=manufacture
c=wear and manufacture
d=indeterminate

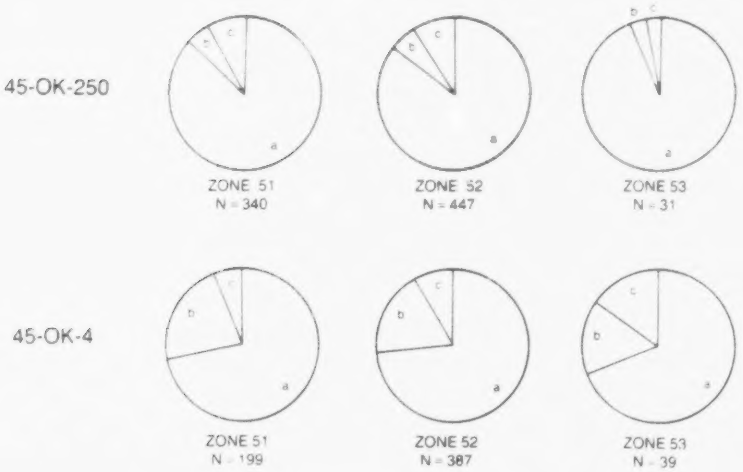

Figure 3-4. Manufacture disposition by zone, 45-OK-250 and 45-OK-4 (based on data in Appendix B, Table B-16).
a=partial
b=total
c=indeterminate

the category of wear only. While this category consistently is more common among the zones at 45-OK-250, the contrast with 45-OK-4 is most pronounced in Zone 52.

Type of manufacture is limited to chipping and one instance of pecking and grinding in Zone 51 of 45-OK-250. Manufacture partially modifies most of the objects; the rest are totally modified or indeterminate (Figure 3-4). 45-OK-4 shows a greater proportion of totally modified objects and fewer partially modified ones. The frequencies, again excluding Zone 53, are fairly consistent by site and zone. When wear occurs on modified artifacts, it most often totally overlaps the manufacture (Figure 3-5). There is a small percentage of artifacts with wear opposite, so independent of, the manufacture, suggesting tool backing.

Feathered chipping generally is the most common kind of wear. Smoothing is next most common, followed by hinged chipping (Figure 3-6). This pattern holds in all of the zones at 45-OK-250. At 45-OK-4 feathered chipping is followed by hinged chipping in frequency and in Zone 52, smoothing is most common, accompanied by an increase in crushing/pecking and a decrease in feathered and hinged chipping.

Feathered and hinged chipping occur primarily unifacially (Figure 3-7). Smoothing is most diverse in its locations, occurring most frequently on edges alone, and, in lower frequencies, unifacially and bifacially on edges and on points. Crushing is most common on surfaces, and is also found on edges. Contrasts between the sites include much more edge abrasion at 45-OK-4 and unifacial abrasion at 45-OK-250. Smoothing is confined more often to edges at 45-OK-4, and crushing/pecking is more often unifacial at 45-OK-4 and bifacial at 45-OK-250.

The association of kind of wear with the shape of the worn location is presented in Figure 3-8. Hinged and feathered chipping generally are associated with straight or convex worn areas. Smoothing and crushing are found more frequently on convex areas than the other two kinds of wear and are found on straight locations. Abrasion is found only on convex and straight areas. Contrasts between the sites which are apparent by zone also occur in the categories of abrasion, smoothing and hinged chipping. In each case there is a lower proportion of the wear on a convex area at 45-OK-4 which is accompanied by a higher proportion on straight locations.

The association of the kind of wear with edge angle is shown in Figure 3-9. The sites differ consistently in all categories with 45-OK-250 tending to have steeper angles. This site follows a pattern observed elsewhere (cf., 45-DO-214, 45-DO-285, 45-OK-287/288), feathered chipping is associated with more acute angles than hinged chipping. It holds true at 45-OK-4 where there are more acute angles and a stronger central tendency in other edge angle distribution. We have sought explanation for these distributions in differences of material type and object type. However, at each site, edge angle distributions for jasper, chalcedony, opal, and quartzite show the same tendency for feathered chipping to be associated with more acute angles. Similarly, we have examined the edge angle distributions for object types contributing the greatest frequencies of wear locations. Bifaces, tabular

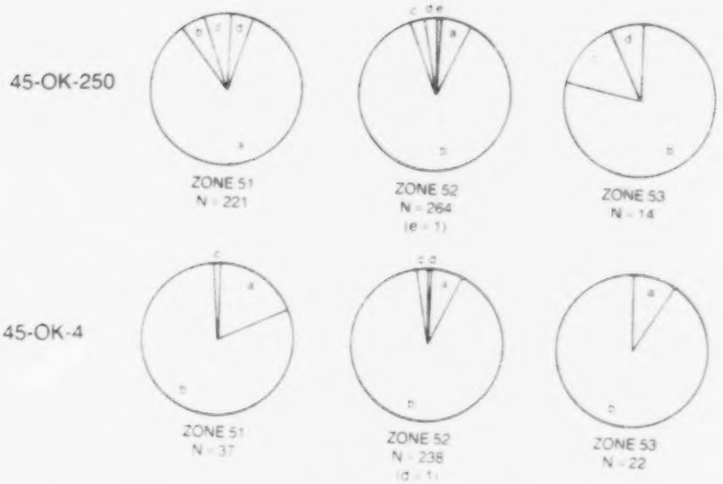

Figure 3-5. Wear and manufacture relationship by zone, 45-OK-250 and 45-OK-4 (based on data in Appendix B, Table B-17).

a=independent
b=total
c=overlap partial
d=independent opposite
e=NA/indeterminate

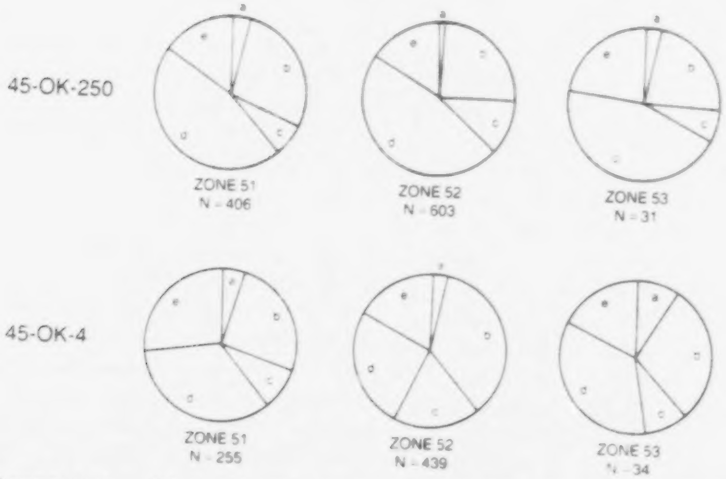

Figure 3-6. Kind of wear by zone, 45-OK-250 and 45-OK-4 (based on data in Appendix B, Table B-18).

a=abrasion/grinding
b=smoothing
c=crushing
d=feathered chipping

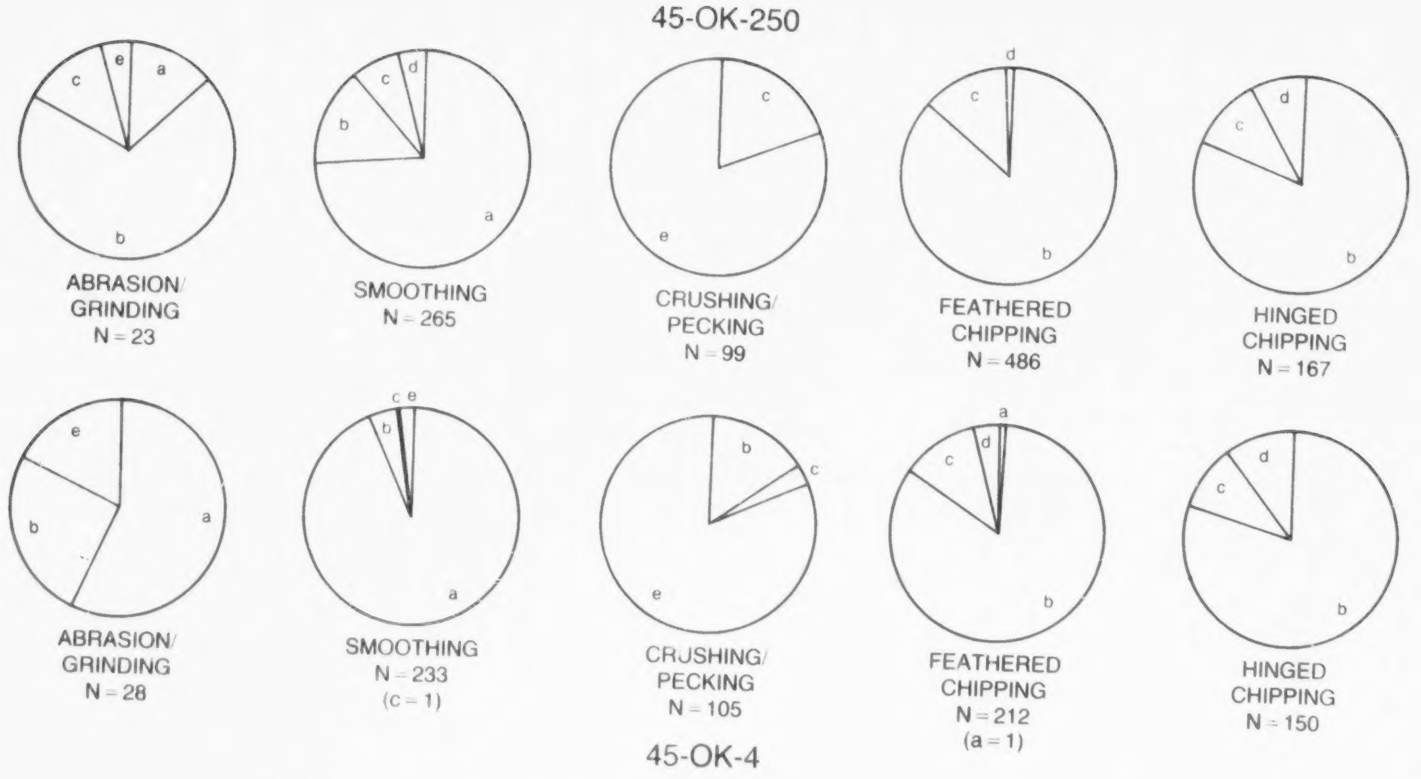

Figure 3-7. Kind of wear by location of wear, 45-OK-250 and 45-OK-4.
a=edge
b=unifacial edge
c=bifacial edge
d=point
e=surface/terminal surface

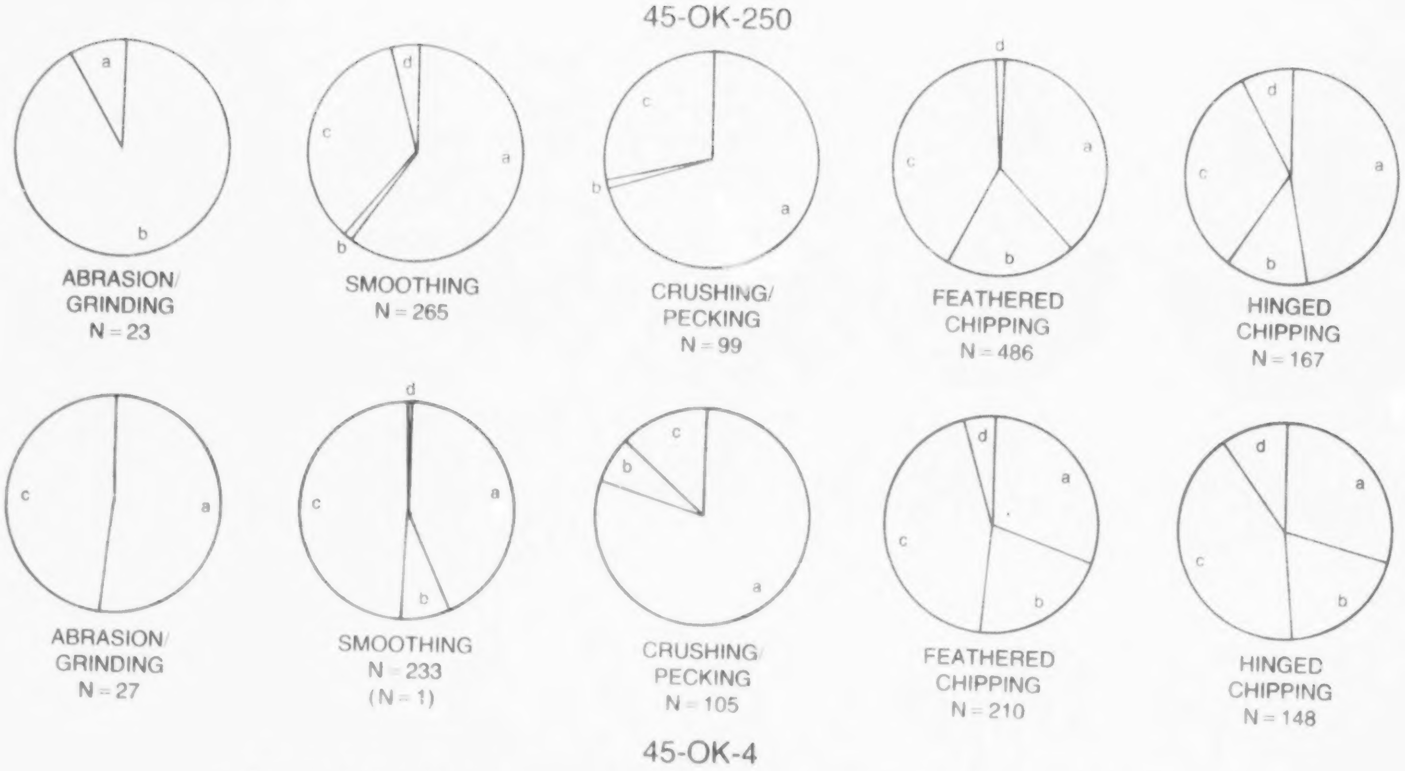

Figure 3-8. Kind of wear by shape of worn area, 45-OK-250 and 45-OK-4.

a=convex
b=concave
c=straight
d=point

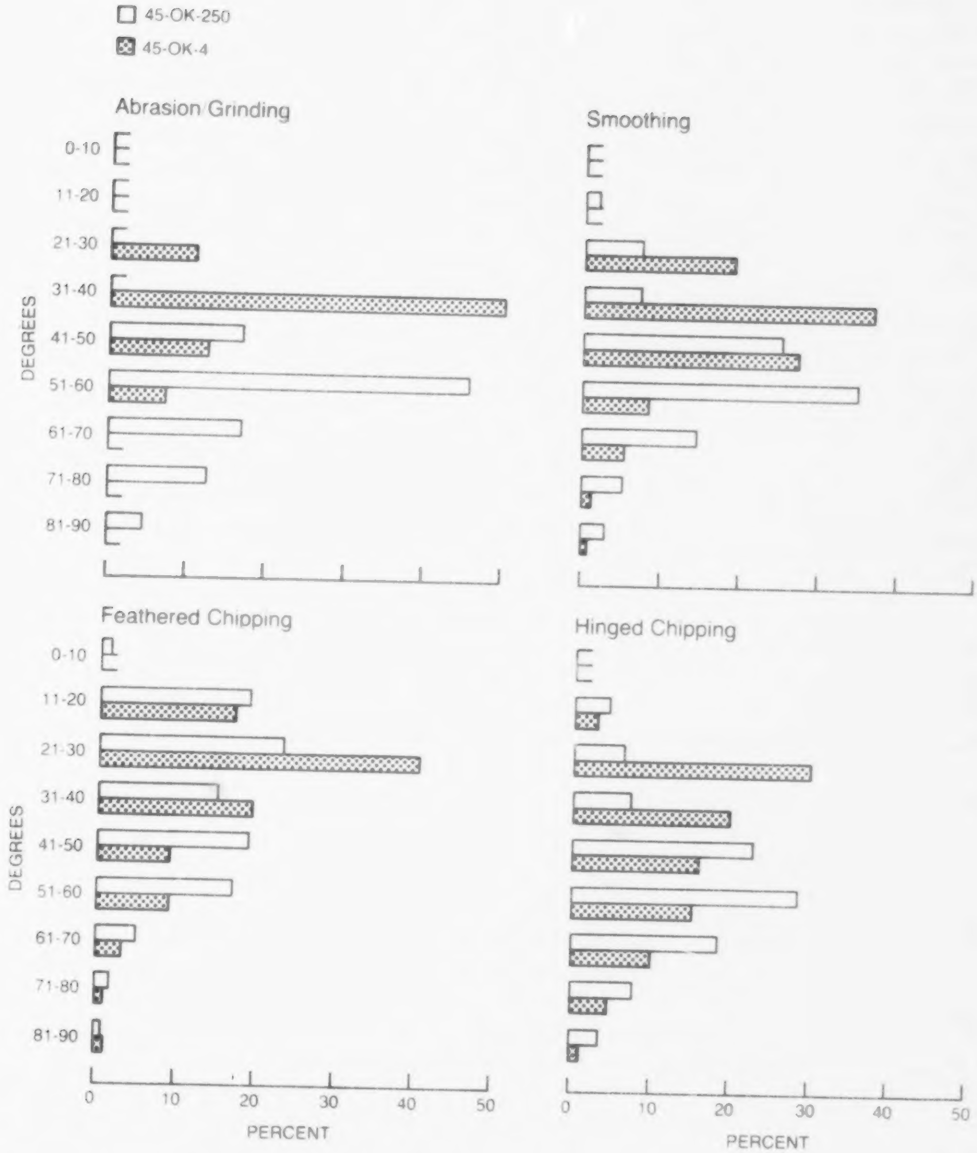

Figure 3-9. Kind of wear by edge angle (does not include angles >90 degrees), 45-OK-250 and 45-OK-4.

knives, scrapers and unifacially retouched flakes show the same pattern of angles at each site.

Most of the wear is oriented perpendicular to the edge. Less than 2.8% at 45-OK-250 and 3.4% at 45-OK-4 had oblique, parallel, or diffuse orientation. The condition of the wear, that is, the complete or fragmentary state of the wear location and its complex of variables, was also recorded. More of the wear locations at 45-OK-4 (62.4%) than at 45-OK-250 (56.3%) were determined to be complete.

The intent of manufacture to modify the characteristics of a lithic object is apparent when wear and wear/manufacture are correlated with edge angle (Figure 3-10). Manufactured items show steeper edge angles than unmodified, worn objects. Again, the edge angles from 45-OK-4 are more acute than those from 45-OK-250.

The relationship of kinds of wear to manufacture also helps us understand how tools might have been modified (Figure 3-11). Manufactured items show greater proportions of hinged chipping and smoothing and most of the abrasion. Worn only objects exhibit primarily feathered chipping and have more crushing/pecking wear than manufactured objects. While these associations may be attributed to use, it is likely that some are the result of manufacture. Hinged chipping, in particular, is known to result from platform preparation and flake detachment, especially where a broad-edged percussor is applied. Misadventure is another common source of edge damage (e.g., Flenniken and Haggarty 1979).

Figure 3-12 presents the percentage of worn objects writhen each object type. Figure 3-13 presents the ratios of the number of wear locations to the number of worn objects by object type. They illustrate the general degree of use of a class of artifacts without implying function and the degree to which functional attributes influence classification. Projectile points, bases and tips, bifaces and linear flakes, all objects whose definitions are more closely associated with morphology and the manufacturing system, show relatively low ratios and wear percentages. Drills, resharpening flakes, bifacially retouched flakes and choppers have medium ratios, indicating that they depend strongly on morphology for definition. The ratio of 1.00 may reflect low object type frequency or the use of a single functional attribute for definition as in the case of the anvil and the hopper mortar bases. Ratios greater than 1.00 reflect the presence of several tools on single objects. This may indicate that an object has been used for several tasks, or bears traces not directly related to use as in the case of hafting wear. The high ratios for hammerstones, unifacially retouched flakes, and utilized flakes reflect a tendency to use these tools repeatedly.

With the functional characteristics of the site assemblage in mind, we may examine traditional lithic artifact nomenclature. In the subsequent discussion, the lithic artifact assemblage is examined in terms of formal object types. Accompanying tables present, where appropriate, kinds of wear, locations of wear, and shapes of worn locations. Tables 3-9 and 3-10 present edge angle data in 30 degree intervals in relation to kind and location of wear by object type. Illustrations of typical artifacts accompany the discussion.

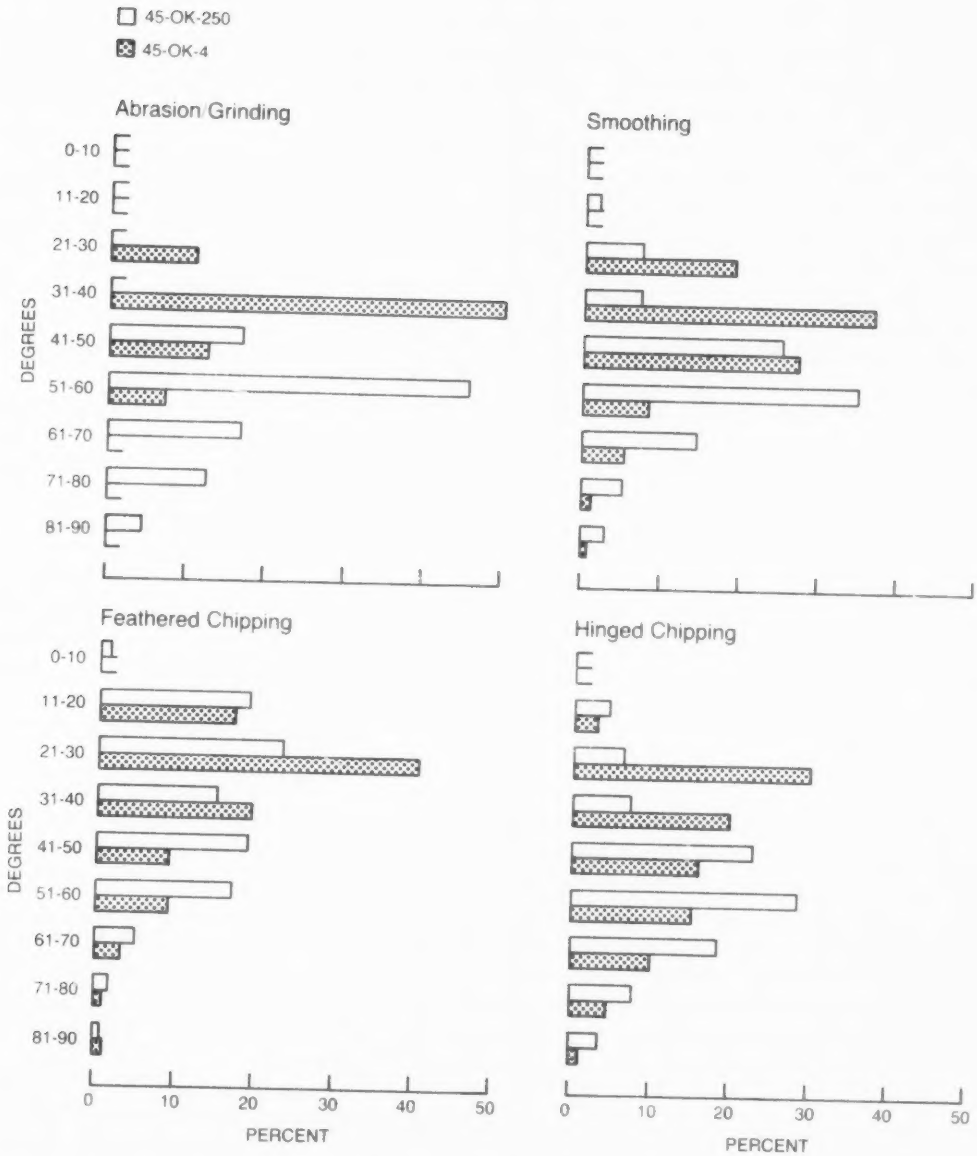

Figure 3-9. Kind of wear by edge angle (does not include angles >90 degrees), 45-OK-250 and 45-OK-4.

knives, scrapers and unifacially retouched flakes show the same pattern of angles at each site.

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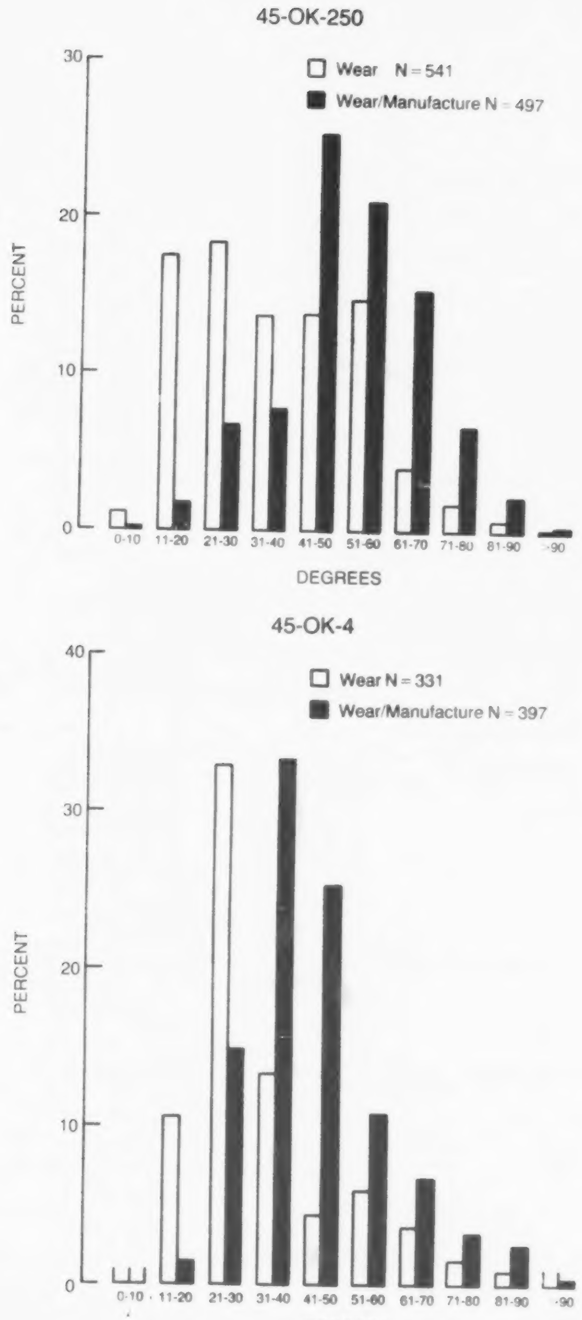

Figure 3-10. Wear and wear/manufacture by edge angle (does not include surfaces or indeterminate modification), 45-OK-250 and 45-OK-4.

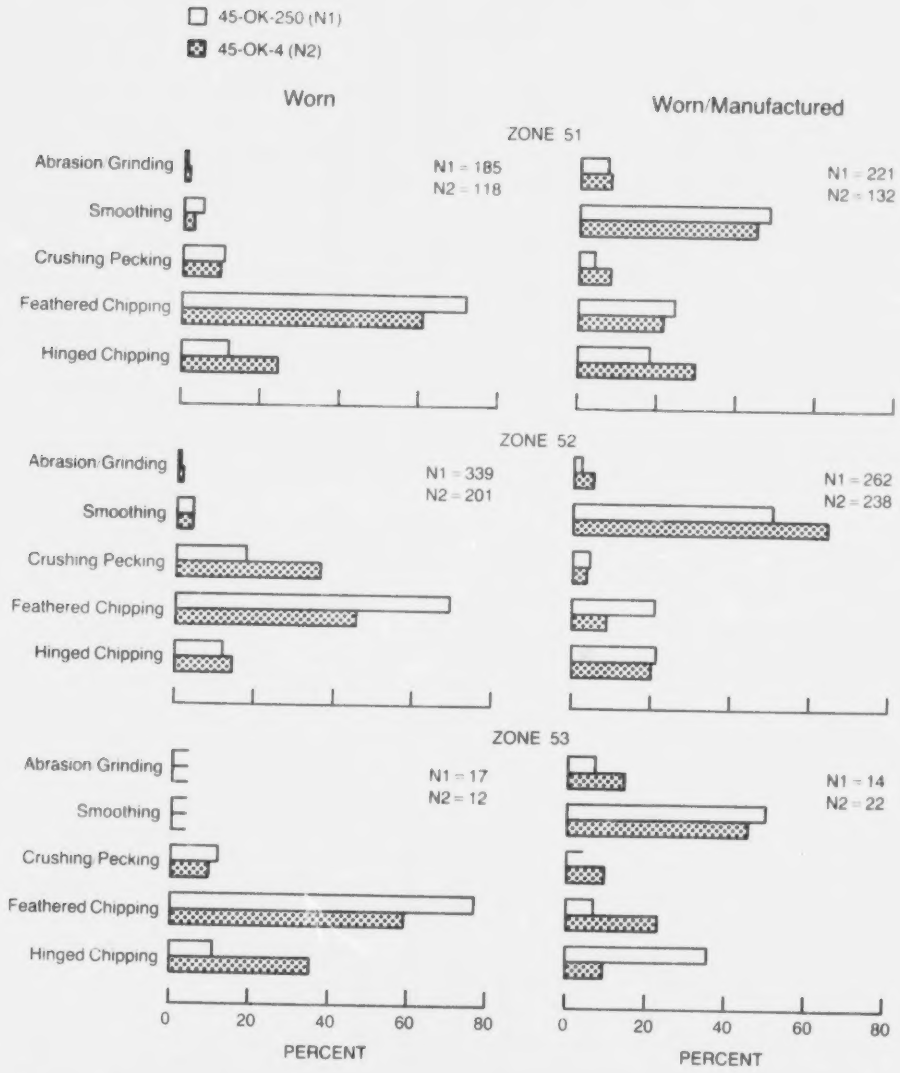

Figure 3-11. Kind of wear by utilization and modification by zone (does not include indeterminate modification), 45-OK-250 and 45-OK-4.

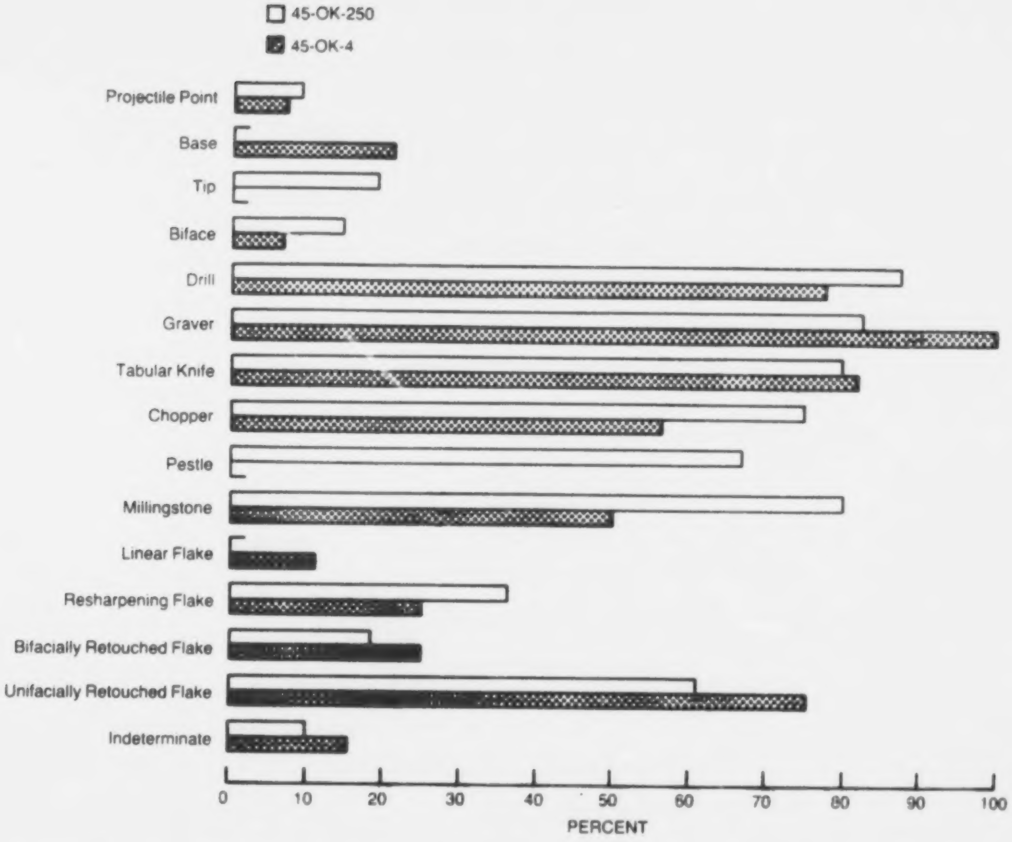

Figure 3-12. Percent of objects with wear or wear and manufacture (does not include indeterminate modifications or classes with all objects worn), 45-OK-250 and 45-OK4.

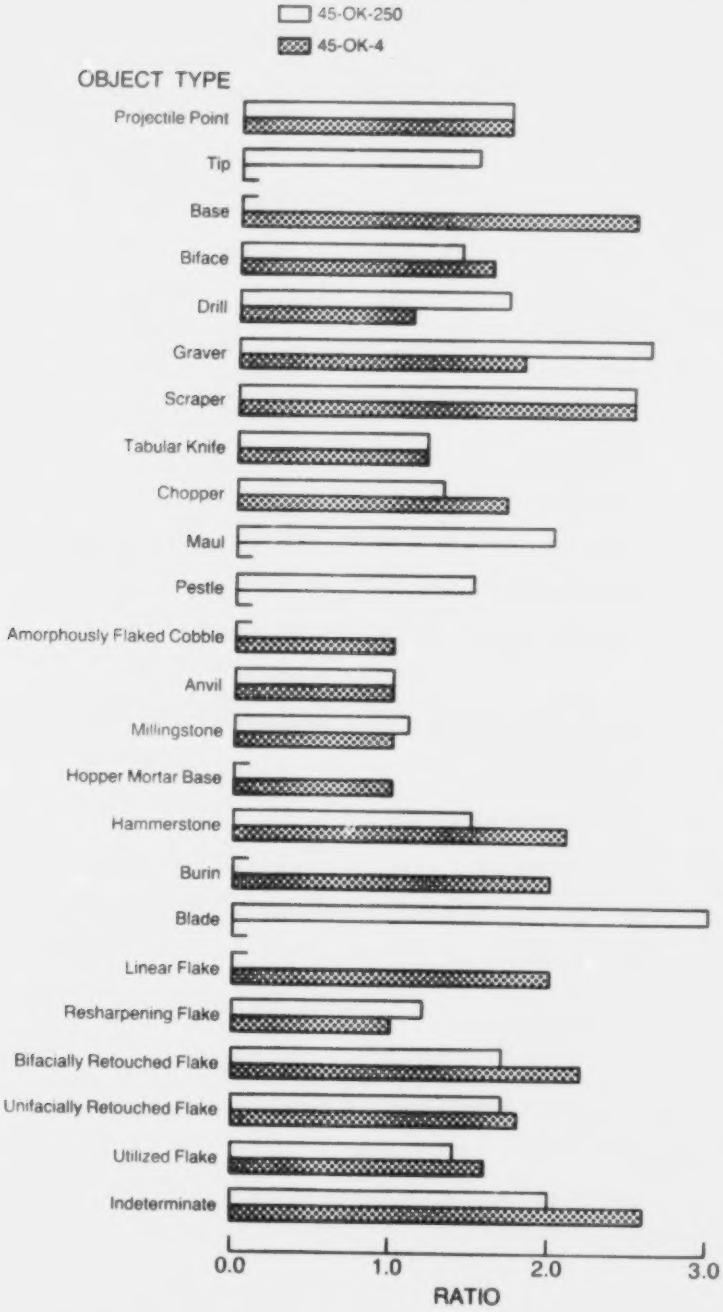

Figure 3-13. Ratio of number of worn locations to number of worn objects, 45-OK-250 and 45-OK-4.

Table 3-9. Kind of wear, location of wear, and edge angle by object type, 45-OK-250.

Kind of Wear	Abrasion/Grinding					Smoothing									Crushing/Pecking		Feathered Chipping						Hinged Chipping						Total		
Location of Wear	Edge	Unifacial		Bifacial		Edge			Unifacial			Bifacial			Bifacial		Unifacial			Bifacial			Unifacial			Bifacial					
Angle[2]	2	2	3	2	3	1	2	3	1	2	3	1	2	3	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Object Type																															
Projectile point[3]	–	–	–	–	–	–	–	–	–	–	–	–	2	2	–	–	2	–	–	–	–	–	–	3	3	–	–	–	2	5	5
Bifaces	–	–	–	–	–	1	–	–	–	–	–	–	2	3	–	–	–	3	1	–	–	–	–	3	2	–	2	3	1	10	9
Drill	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	1	2	–	–	–	–	4	1	–	–	–	2	5	3
Graver	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	1	–	–	–	–	1	4	–	–	–	–	2	6	–
Scraper	–	7	6	–	–	–	–	–	–	4	2	–	1	–	–	–	1	12	2	1	–	–	–	8	6	–	1	1	2	33	17
Tabular knife	3	–	–	2	–	18	137	38	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	19	143	38
Chopper	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	11	–	–	–	–	–	–	–	–	–	–	–	1	–	3	12
Maul	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Pestle	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Core	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Blade	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	1	–	–	–	–	–	3	–
Resharpening flake	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	9	1	–	3	–	–	2	2	–	–	1	–	15	5
Bifacially retouched flake	–	–	–	–	1	–	–	1	–	–	1	–	1	–	–	–	–	11	–	1	1	1	–	6	–	–	–	1	1	18	5
Unifacially retouched flake	–	2	–	–	–	–	–	–	1	10	3	–	1	2	–	–	10	32	9	6	4	1	1	23	17	–	1	–	18	73	32
Utilized flake	–	1	–	–	–	–	–	–	4	7	3	–	2	–	2	1	158	140	16	19	22	2	14	31	3	–	3	4	195	211	29

[1] Does not include angles >90 degrees, pointed locations, or indeterminate objects.
[2] Grouped edge angles: 1=0-30 degrees, 2=31-60 degrees, 3=61-90 degrees.
[3] Includes top and bases.

Table 3-10. Kind of wear, location of wear, and edge angle by object type, 45-OK-4.

Kind of Wear	Abrasion/Grinding				Smoothing							Crushing/Pecking			Feathered Chipping								Hinged Chipping						Total		
Location of Wear	Edge		Unifacial		Edge			Unifacial			Bifacial	Unifacial	Bifacial		Edge		Unifacial			Bifacial			Unifacial			Bifacial					
Angle^2	1	2	1	2	1	2	3	1	2	3	2	3	2	3	1	2	1	2	3	1	2	2	1	2	3	1	2	3	1	2	3
Object Type																															
Projectile point^3	2	7	–	–	2	6	–	1	–	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	5	15	–
Bifaces	–	4	–	–	–	4	–	–	1	–	–	–	1	–		–	–	–	–	–	–	–	–	–	1	–	–	–		10	1
Drill	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–
Graver	–	–	–	–	–	–	–	–	–	–	–	2	1	–	3	5	–	–	–	–	–	–	–	–	–	–	–	–	3	6	2
Scraper	–	–	–	3	–	1	–	–	2	1	–	–	–	–	–	1	2	9	1	–	–	–	3	14	2	–	–	–	5	27	7
Tabular knife	–	3	1	–	29	158	13	–	–	–	–	3	–	–	–		–	–	–	–	–	–	–	–	–	–	–	–	30	161	16
Chopper	–	–	–	–	–	–	–	–	–	–	–	8	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	9
Amorphously flaked cobble	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Hammerstone	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Burin	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1
Linear flake	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	2	–	–
Resharpening flake	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1	–
Bifacially retouched flake	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	2	3	–	2	2		5	6
Unifacially retouched flake	–	–	–	1	–	–	–	–	3	–	–		–	–	–	–	8	4	2	–	1	1	14	25	6	–	3	–	22	37	9
Utilized flake	–	–	–	2	–	–	–	2	–	–	–	2	–	–	–	–	95	39	5	10	10	1	25	16	6	2	5	–	134	72	14
Total	2	14	1	3	31	189	14	3	6	1	1	17	3	1	3	6	107	54	9	10	12	2	42	58	18	2	10	2	202	338	405

[1] Does not include angles >90 degrees, pointed locations, or indeterminate objects.

[2] Grouped edge angles: 1=0-30 degrees, 2=31-60 degrees, 3=61-90 degrees.

[3] Includes top and bases.

PROJECTILE POINTS, BASES, TIPS

These artifacts will be more thoroughly discussed in the stylistic analysis and are illustrated there. Generally, they are bifacially flaked, axially symmetrical objects, lenticular to planoconvex in cross section, triangular- to lozenge-shaped in plan section, with basal modification for hafting to an arrow, dart, or lance shaft.

All of the objects included in this category may not have been intended for use as projectile points. The stylistic analysis identified large and small triangular, finely finished objects (Morphological Types 1 and 2) lacking basal modification. Type 1 may more appropriately be termed a knife and Type 2 the preform stage in the previously discussed bifacial reduction sequence.

Less than 9% of the projectile points display functional traces while bases and tips have more wear (Figure 3-12). The projectile points from the two sites show dissimilar complexes of wear (Table 3-11). Those from 45-OK-250 have a greater diversity of kinds of wear, locations of wear, shapes of worn areas, and edge angles. Smoothing and hinged chipping found unifacially, bifacially and on points are the major categories. At 45-OK-4 wear is restricted almost entirely to abraded and smoothed convex and straight edges. Only a single artifact shows damage on a pointed location.

It is difficult to explain the contrasting distributions. The formal analysis of classifiable projectile points shows little variation in the styles of points at each site. On the basis of this data we can suggest that the occupants of 45-OK-250 undertook a greater diversity of tasks with morphologically similar implements. In addition, many of the traces from this site are more easily attributed to manufacturing processes as in the case of unifacial hinged chipping and to actual use of projectiles which is expected to cause damage to tips. The uniformity of the wear at 45-OK-4 suggests the implements were used only for cutting tasks in addition to their traditional functions. Despite having more tips at 45-OK-4 (Table 3-1), there is little damage to points.

Breakage data for projectile points also provide information about use. Appendix B, Figure B-1 presents the variables of the breakage analysis which was applied only to classifiable specimens. Thirty-seven of the 101 projectile points from 45-OK-250 and 31 of the 100 projectile points from 45-OK-4 included in the stylistic analysis are complete specimens. The remaining points have 158 breakage locations (Table 3-12). The most common location of breakage is the blade with the breaks oriented diagonally or perpendicularly to the long axis of the projectile point. Distal and proximal blade breakage is more common than mid-blade breakage locations. Barbs and shoulders most often are broken diagonally.

We cannot tell what proportion of the damage to projectile points is due to impact. Diagonal and parallel breaks could result from force applied to the long axis of the object. Perpendicular breaks would result from application of lateral force to the blade. We do not know the context in which these forces were applied. That the blade typically receives the damage

Table 3-11. Kind of wear and shape of worn area for projectile points, tips, and bases by zone, 45-OK-250 and 45-OK-4.

Kind of Wear			Wear Complex						Zone						Total	
			Location of Wear			Shape of Worn Area			51		52		53			
	45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion	–	45.0	Edge	–	45.0	Convex	–	10.0	–	2	–	–	–	–		2
						Straight	–	35.0	–	1	–	6				7
Smoothing	42.2	50.0	Edge	–	40.0	Convex	–	20.0	–	–	–	2	–	2	–	4
						Straight	–	15.0	–	3	–	–		–	–	3
						Point	–	5.0	–	–	–	–	–	1	–	1
			Unifacial	–	5.0	Straight	–	5.0	–	–	–	1	–	–	–	1
			Bifacial	21.1	5.0	Convex	15.8	5.0	–	–	3	1	–	–	3	1
						Straight	5.3	–	–	–	1	–	–	–	1	–
			Point	21.1	–	Point	21.1	–	1	–	3	–	–	–	4	–
Feathered Chipping	15.8	5.0	Unifacial	10.5	–	Convex	10.5	–	2	–	–	–	–	–	2	–
			Bifacial	–	5.0	Straight	–	5.0	–	1	–	–	–	–	–	1
			Point	5.3	–	Point	5.3	–	–	–	1	–	–	–	1	–
Hinged Chipping	42.1	–	Unifacial	31.6	–	Convex	21.1	–	2	–	2	–	–	–	4	–
						Straight	10.5	–	2	–	–	–	–	–	2	–
			Point	10.5	–	Point	10.5	–	1	–	1	–		–	2	–
Total N									8	7	11	10	–	3	19	20

suggests that hafting protected the proximal base and neck. Breakage of barbs and shoulders suggests that these were exposed. As the stylistic analysis will show, most of the points are fairly robust styles with relatively thick necks and few delicate projections susceptible to breakage.

Table 3-12. Projectile point breakage location and kind by zone, 45-OK-250 and 45-OK-4.

Location	Kind	Zone 51		Zone 52		Zone 53		Total	
		45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4
Distal One-third	Diagonal	5	7	4	2	–	1	9	10
	Perpendicular	1	7	7	7	1	2	8	16
	Parallel	–	1	–	–	–	–	–	1
	Multiple	2	3	–	2	–	–	2	5
	Reworked	–	–	–	1	–	–	–	1
Mid-Blade	Diagonal	2	1	–	–	–	–	2	1
	Perpendicular	3	–	2	–	1	–	6	–
	Multiple	–	2	–	–	–	–	–	2
Stem/Base	Diagonal	1	1	–	–	–	1	1	2
	Perpendicular	–	–	2	–	–	–	2	–
	Multiple	–	–	1	–	–	–	1	–
Proximal	Diagonal	3	4	4	6	–	–	7	10
	Perpendicular	–	1	5	1	–	–	5	2
	Parallel	1	2	–	–	–	–	1	2
	Multiple	2	2	3	2	–	–	5	4
	Reworked	–	–	1	1	–	–	1	1
Barb/Shoulder	Diagonal	2	1	1	3	–	–	3	4
	Parallel	–	–	1	–	–	–	1	–
	Multiple	–	–	1	–	–	–	1	–
	Reworked	–	1	1	2	–	1	1	4
Not Applicable	Perpendicular	–	–	–	1	–	–	–	1
	Parallel	–	–	2	2	–	–	2	2
	Multiple	–	–	3	2	–	–	3	2
	Reworked	1	–	–	1	–	–	1	1
Reworked		6	6	6	5	–	1	12	12
Total		29	39	44	38	2	6	75	83

The breakage analysis was applied only to projectile points complete enough to be considered for stylistic analysis. Other tips, bases and fragments included in the functional analysis were not examined. It also does not take into account possible projectile point fragments included in the biface category.

BIFACES

This type of artifact has been mentioned in the discussion of the lithic reduction sequence. The objects usually are made from flakes. They are thin, lenticular in cross section, and ovate, sub-triangular or leaf-shaped in plan view (Plate 3-1;a through e). Numerous fragments of other kinds of bifacial artifacts have been included in the category. Bifaces are distinguished from projectile points by lack of basal modification, greater breadth, and less retined, unpatterned or collateral flake scars. As with the projectile points, few of the objects display wear (Figure 3-12).

The differences in wear complexes between the sites for these artifacts continues the pattern noted for the projectile points (Table 3-13). 45-OK-250 again shows more variability. Smoothing and hinged chipping are the major kinds of wear. At 45-OK-4 abrasion and smoothing of edges are predominant with a near absence of hinged chipping. We may again seek explanation in multiple tasks and residual manufacturing traces for the artifacts from 45-OK-250 and uniformity of tasks at 45-OK-4.

The high frequency of abrasion and smoothing, edge and bifacial damage, and associated median edge angles suggests cutting activities. The hinged chipping damage and steeper angles suggest scraping of more substantial media such as wood or bone.

DRILLS

Objects in this category include artifacts that are completely bifacially modified to form a thin, elongated tip and bifacially modified projections on flakes (Plate 3-1;f-h).

There are more wear complexes and nearly twice as many of these kinds of artifacts from 45-OK-250 as from 45-OK-4 (Tables 3-14, 3-1). At both sites hinged and feathered chipping are prominent on points. Wear complexes are more diverse at 45-OK-250, an observation attributable to differences in sample size. The additional complexes may be associated with light scraping or hafting practices, although few of the artifacts are extensively modified.

The low incidence of smoothed points suggests use was neither intense nor repetitive enough to produce this attrition; this observation supports the idea of casual manufacture and discard.

GRAVERS

Artifacts in this category are characterized by unifacially modified projecting tips. Gravers may be entirely modified by manufacture into the desired form or show intentional retouch only on the bit. The form of these artifacts is similar to most of the drills (Plate 3-1;i through n). They are distinguished in classification on the basis of the location of wear on the points; gravers have unifacial attrition, drills bifacial. Because our combination of location of wear variables does not discriminate this distinction, the wear complexes for gravers are very similar to those of the drills (Table 3-15). The similarity of graver morphology and wear to that of the drills suggests a continuum of use and a similar casual production.

SCRAPERS

Scrapers have been defined as flakes with steep, unifacial, intentional retouch forming a convex edge. The shape of the original flake and most of one surface must be altered by the modification (Plate 3-1;o through t). These artifacts show similar wear complexes appearing with slightly different proportions at each site (Table 3-16). Abrasion and smoothing are more common at 45-OK-250; hinged chipping at 45-OK-4. Although the complexes generally

Table 3-13. Kind of wear, location of wear, and shape of worn area for bifaces by zone, 45-OK-250 and 45-OK-4.

Wear Complex									Zone						Total	
Kind of Wear			Location of Wear			Shape of Worn Area			51		52		53			
	45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding	-	36.4	Edge	-	36.4	Convex	-	18.2	-	-	-	-	-	2	-	2
						Straight	-	18.2	-	-	-	1	-	1	-	2
Smoothing	34.7	45.5	Edge	4.3	36.4	Convex	-	27.3	-	2	-	1	-	-	-	3
						Straight	4.3	9.1	-	-	1	1	-	-	1	1
			Unifacial	-	9.1	Convex	-	9.1	-	1	-	-	-	-	-	1
			Bifacial	21.7	-	Convex	13.0	-	2	-	1	-	-	-	3	-
						Straight	8.7	-	1	-	1	-	-	-	2	-
			Point	8.7	-	Point	8.7	-	-	-	2	-	-	-	2	-
Crushing/Pecking	-	9.1	Bifacial	-	9.1	Convex	-	9.1	-	-	-	1	-	-	-	1
Feathered Chipping	17.3	-	Unifacial	17.3	-	Convex	13.0	-	2	-	1	-	-	-	3	-
						Straight	4.3	-	1	-	-	-	-	-	1	-
Hinged Chipping	47.7	9.1	Unifacial	21.7	9.1	Convex	8.7	-	1	-	-	-	1	-	2	-
						Concave	4.3	-	-	-	-	-	1	-	1	-
						Straight	8.7	9.1	-	-	2	1	-	-	2	1
			Bifacial	21.7	-	Convex	17.4	-	-	-	3	-	1	-	4	-
						Straight	4.3	-	1	-	-	-	-	-	1	-
			Point	4.3	-	Point	4.3	-	1	-	-	-	-	-	1	-
Total N									9	3	11	5	3	3	23	11

KEY: Site Number:
Master Number:
Tool Type:
Provenience/Level/Feature
Zone:
Material:

	Site Number	Master Number	Tool Type	Provenience/Level/Feature	Zone	Material
a.	45-OK-250	185	Biface	6N32E/60	22	Jasper
b.	45-OK-250	1070	Biface	1S26W/110/FE73	14	Jasper
c.	45-OK-250	372	Biface	21S51W/90/FE19	22	Opal
d.	45-OK-4	399	Biface	15S26W/130	43	Fine-grained basalt
e.	45-OK-4	491	Biface	6S21E/160	32	Opal
f.	45-OK-250	1879	Drill	Beach 4	-	Jasper
g.	45-OK-4	301	Drill	17S13E/20	31	Jasper
h.	45-OK-250	609	Drill	10N22W/90/FE47,62	13	Jasper
i.	45-OK-250	972	Graver	1N31W/120	12	Jasper
j.	45-OK-250	377	Graver	21S52W/110/FE26	22	Jasper
k.	45-OK-250	256	Graver	9N39W/110	22	Jasper
l.	45-OK-4	147	Graver	10S11E/40	31	Jasper
m.	45-OK-4	528	Graver	13S17E/80	32	Petrified wood
n.	45-OK-4	486	Graver	6S21E/10	31	Jasper
o.	45-OK-250	280	Scraper	8N38W/110/FE30	23	Jasper
p.	45-OK-4	334	Scraper	18S12E/90	32	Jasper
q.	45-OK-4	502	Scraper	13S16E/70	31	Jasper
r.	45-OK-250	1498	Scraper	8S26W/140/FE95	13	Jasper
s.	45-OK-250	589	Scraper	5N28W/50	11	Jasper
t.	45-OK-4	148	Scraper	10S11E/40	31	Opal

Plate 3-1. Bifaces, drills, gravers, and scrapers, 45-OK-250 and 45-OK-4.

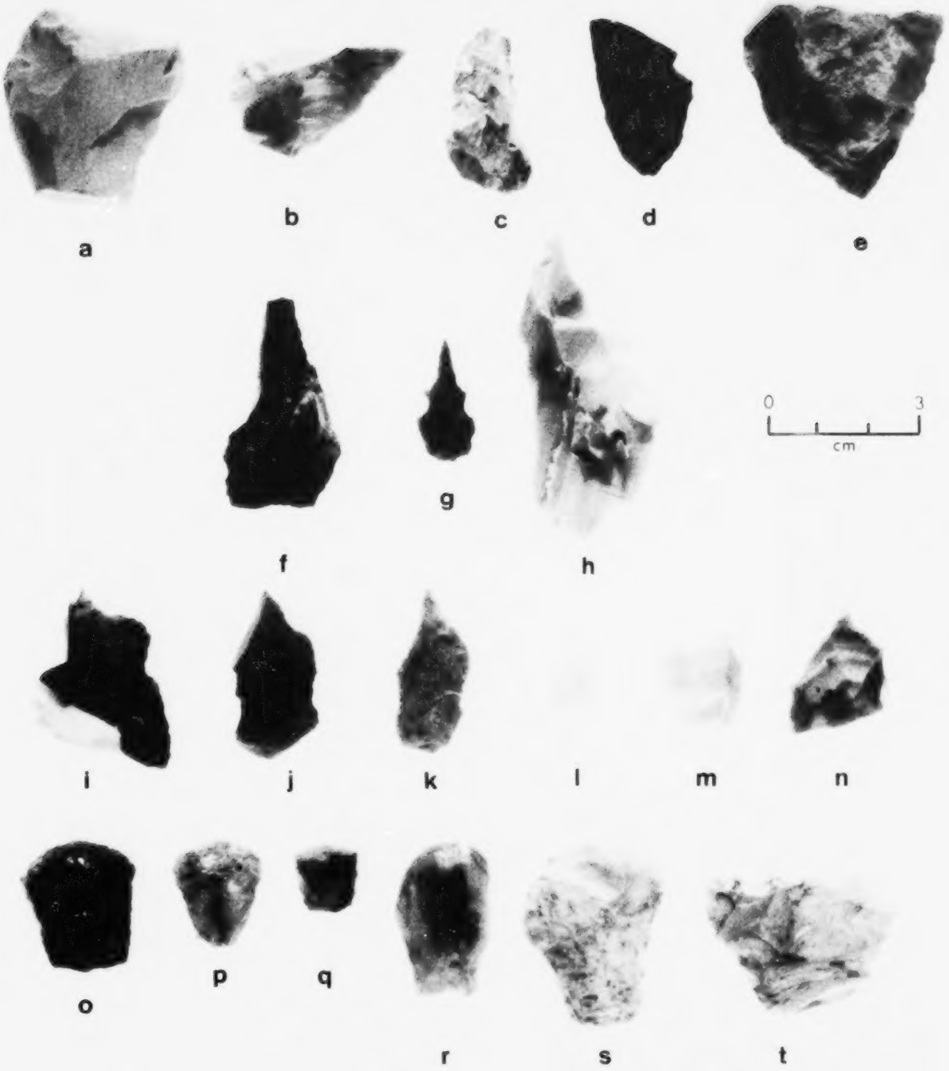
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Table 3-14. Kind of wear, location of wear, and shape of worn area for drills by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Smoothing 34.7	45.5	Point 4.3	36.4	Point –	27.3	1	–	2	–	–	–	3	–
Feathered Chipping 25.1	25.0	Unifacial 20.9	–	Convex 4.2	–	1	–	–	–	–	–	1	–
				Concave 12.5	–	2	–	1	–	–	–	3	–
				Straight 4.2	–	–	–	1	–	–	–	1	–
		Point 12.5	25.0	Point 12.5	25.0	–	–	3	2	–	–	3	2
Hinged Chipping 54.1	75.0	Unifacial 20.8	12.5	Convex 8.3	12.5	–	1	2	–	–	–	2	1
				Straight 12.5	–	1	–	2	–	–	–	3	–
		Point 33.3	62.5	Point 33.3	62.5	2	4	5	1	1	–	8	5
Total N						7	5	16	3	1	–	24	8

Table 3-15. Kind of wear, location of wear, and shape of worn area for gravers by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	5-OK-250 N	45-OK-4 N
Smoothing 15.4	-	Unifacial 7.7	-	Convex 7.7	-	-	-	1	-	-	-	1	-
		Point 7.7	-	Point 7.7	-	-	-	1	-	-	-	1	-
Feathered Chipping 23.1	52.0	Unifacial 15.4	32.0	Convex 7.7	8.0	1	1	-	-	-	1	1	2
				Concave -	12.0	-	2	-	1	-	-	-	3
				Straight 7.7	12.0	-	2	1	1	-	-	1	3
		Point 7.7	20.0	Point 7.7	20.0	1	3	-	2	-	-	1	5
Hinged Chipping 61.6	48.0	Unifacial 38.5	8.0	Convex 7.7	8.0	1	1	-	1	-	-	1	2
				Concave 23.1	-	-	-	3	-	-	-	3	-
				Straight 7.7	-	-	-	1	-	-	-	1	-
		Bifacial -	4.0	Convex -	4.0	-	1	-	-	-	-	-	1
		Point 23.1	36.0	Point 23.1	36.0	1	4	2	4	-	1	3	9
Total N						4	14	9	9	-	2	13	25

Table 3-16. Kind of wear, location of wear, and shape of worn area for gravers by zone, 45-OK-250 and 45-OK-4.

Wear Complex									Zone						Total	
Kind of Wear			Location of Wear			Shape of Worn Area			51		52		53			
	45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding	25.0	7.5	Unifacial	25.0	7.5	Convex	25.0	7.5	9	1	4	2	-	-	13	3
Smoothing	13.4	10.0	Edge	-	2.5	Convex	-	2.5	-	1	-	-	-	-	-	1
			Unifacial	11.5	7.5	Convex	11.5	5.0	1	-	5	2	-	-	6	2
						Straight	-	2.5	-	-	-	1	-	-	-	1
			Bifacial	1.9	-	Convex	1.9	-	1	-	-	-	-	-	1	-
Feathered Chipping	30.7	32.5	Edge	-	2.5	Concave	-	2.5	-	-	-	1	-	-	-	1
			Unifacial	28.8	30.0	Convex	11.5	20.0	1	1	5	4	-	3	6	8
						Concave	5.8	7.5	1	-	2	3	-	-	3	3
						Straight	11.5	2.5	3	-	3	1	-	-	6	1
			Bifacial	1.9	-	Concave	1.9	-	1	-	-	-	-	-	1	-
Hinged Chipping	30.7	50.0	Unifacial	26.9	47.5	Convex	19.2	30.0	4	4	6	7	-	1	10	12
						Concave	-	10.0	-	2	-	2	-	-	-	4
						Straight	7.7	7.5	1	2	3	1	-	-	4	3
			Bifacial	3.8	-	Convex	1.9	-	-	-	1	-	-	-	1	-
						Straight	1.9	-	-	-	1	-	-	-	1	-
			Point	-	2.5	Point	-	2.5	-	-	-	1	-	-	-	1
Total N									22	11	30	25	-	4	52	40

support the proposed function, we may be witnessing a slightly different application to more rigid materials at 45-OK-4, resulting in more hinged chipping. We might also attribute the difference to less intense or more casual use and recall the greater amount of quartzite appearing at 45-OK-4, a material that supplies spalls suitable for scraping functions and does not readily display wear traces.

TABULAR KNIVES

The artifacts in this category are thin slabs of quartzite with unifacial or bifacial modification of some or all edges. Generally bi-planar in cross section, they range from somewhat irregular in outline to ovate, circular, rectangular and subtriangular forms (Plate 3-2). They are manufactured from the locally available quartzite which breaks into thin, laminar pieces. Tabular objects which lack manufacture but display extensive smoothed edge attrition also may be classified as tabular knives.

Over 90% of the wear on tabular knives consists of smoothing of convex or straight edges (Table 3-17). The associated edge angles cover all angle intervals with the median range most common (Table 3-9). There are more steep angles at 45-OK-250 and more acute angles at 45-OK-4 (Table 3-9). The wear complex supports the implied cutting function. However, the implements may also have been used as scrapers, a use supported by ethnographic data (Collier et al. 1942).

CHOPPERS

Choppers are manufactured from large, flat, circular or ovate river cobbles by removing overlapping unifacial or bifacial flakes to form a steep angled, sharp edge (Plate 3-3). Such an edge is adequate for heavy butchering activities and carcass dismemberment. The implement may have been used for the working of wood or the cutting, crushing and splintering of green bone for marrow extraction. Some investigators believe they are initially unifacially flaked and become bifacial from use (Flenniken, in Cleveland et al. 1978).

Many objects are included in this category which display the expected wear on an edge or edge segment, but lack distinctive manufacture. Crushing makes up over 80% of the wear on the choppers from each site (Table 3-18). However, the wear is primarily bifacial at 45-OK-250 and unifacial at 45-OK-4. The wear in either case supports the function and may represent more intense use of the implements at 45-OK-250, if Flenniken's suggestion is accepted.

ADZE

The ground stone objects in this category are very different in manufacture from the flaked stone artifacts. The term adze or celt is traditionally applied to hafted implements used for heavy wood and bone working (Born 1971). One of the artifacts is complete (Plate 3-4;g), the other is a fragment of an object similar in size. Neither is as large as the adzes recovered from 45-DO-214. No wear was recorded for the artifacts.

KEY
Site Number:
Master Number:
Provenience/Level/Feature
Zone:
Material:

a.
45-OK-4
839
11S7E/90/FE35
32
Coarse-grained quartzite

b.
45-OK-4
391
15S26W/FE12
42
Coarse-grained quartzite

c.
45-OK-250
1106
1S27W/125/FE73
14
Coarse-grained quartzite

d.
45-OK-250
830
3N25W/135/FE7
13
Coarse-grained quartzite

e.
45-OK-250
359
20S51W/110/FE19
22
Coarse-grained quartzite

f.
45-OK-4
1008
5N30E/30
31
Coarse-grained quartzite

Plate 3-2. Tabular knives, 45-OK-250 and 45-OK-4.

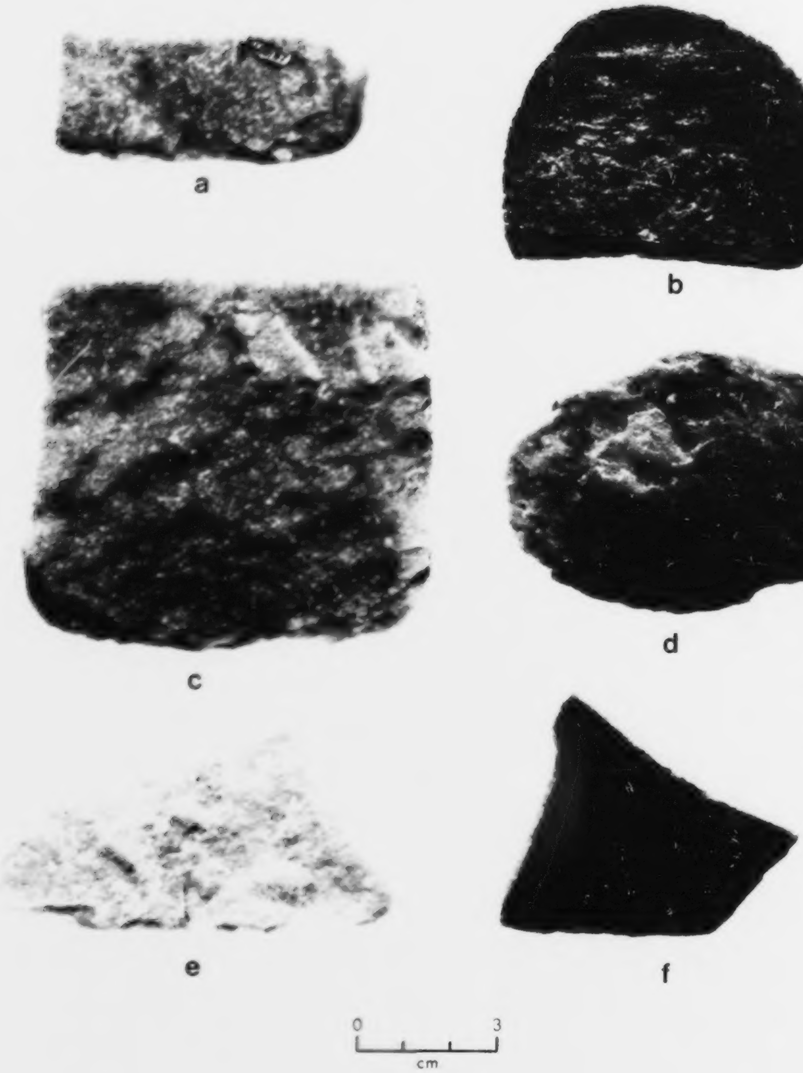
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Table 3-17. Kind of wear, location of wear, and shape of worn area for tabular knives by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding 2.5	1.9	Edge 1.5	1.4	Convex 1.5	1.4	2	3	1	-	-	-	13	3
		Unifacial -	0.5	Convex -	0.5	-	1	-	-	-	-	-	1
		Bifacial 1.0	-	Convex 1.0	-	2	-	-	-	-	-	2	-
Smoothing 97.1	96.7	Edge 96.5	96.7	Convex 59.7	41.1	62	15	54	68	4	2	120	85
				Concave 0.5	6.3	1	3	-	10	-	-	1	13
				Straight 36.3	49.3	28	35	43	63	2	4	73	102
		Bifacial 0.5	-	Straight 0.5	-	1	-	-	-	-	-	1	-
Crushing/Pecking -	1.5	Unifacial -	1.0	Convex -	1.0	-	2	-	-	-	-	-	2
				Straight -	0.5	-	-	-	1	-	-	-	1
Feathered Chipping 0.5	-	Unifacial 0.5	-	Concave 0.5	-	1	-	-	-	-	-	1	-
Total N						97	59	98	141	6	6	201	207

Table 3-18. Kind of wear, location of wear, and shape of worn area for choppers by zone, 45-OK-250 and 45-OK-4.

Wear Complex									Zone						Total	
Kind of Wear			Location of Wear			Shape of Worn Area			51		52		53			
	45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding	-	20.0	Surface	-	20.0	Straight	-	13.3	-	1	-	1	-	-	1-	2
						Irregular	-	6.7	-	1	-	-	-	-	-	1
Crushing/Packing	93.4	80.0	Unifacial	-	53.4	Convex	-	46.7	-	5	-	1	-	1	-	7
						Straight	-	6.7	-	-	-	-	-	1	-	1
			Bifacial	93.4	13.3	Convex	66.7	13.3	5	1	5	1	-	-	10	2
						Straight	26.7	-	3	-	1	-	-	-	4	-
			Terminal Surface	-	13.3	Convex	-	13.3	-	2	-	-	-	-	-	2
Hinged Chipping	6.7	-	Bifacial	6.7	-	Straight	6.7	-	-	-	1	-	-	-	1	-
Total N									9	10	7	31	-	2	15	15

KEY:
Site Number:
Master Number:
Tool Type: standard analysis/reanalysis if different
Provenience/Level:
Zone:
Material:

a.
45-OK-4
931
Chopper/Flake spall
14S13E/40
31
Coarse-grained quartzite

b.
45-OK-4
744
Chopper
0N28W/40
41
Coarse-grained quartqite

c.
45-OK-4
321
Chopper
18S12E/20
31
Coare-grained quartzite

d.
45-OK-4
736
Tabular knife/Chopper
11S35E/40
41
Coarse-grained quartzite

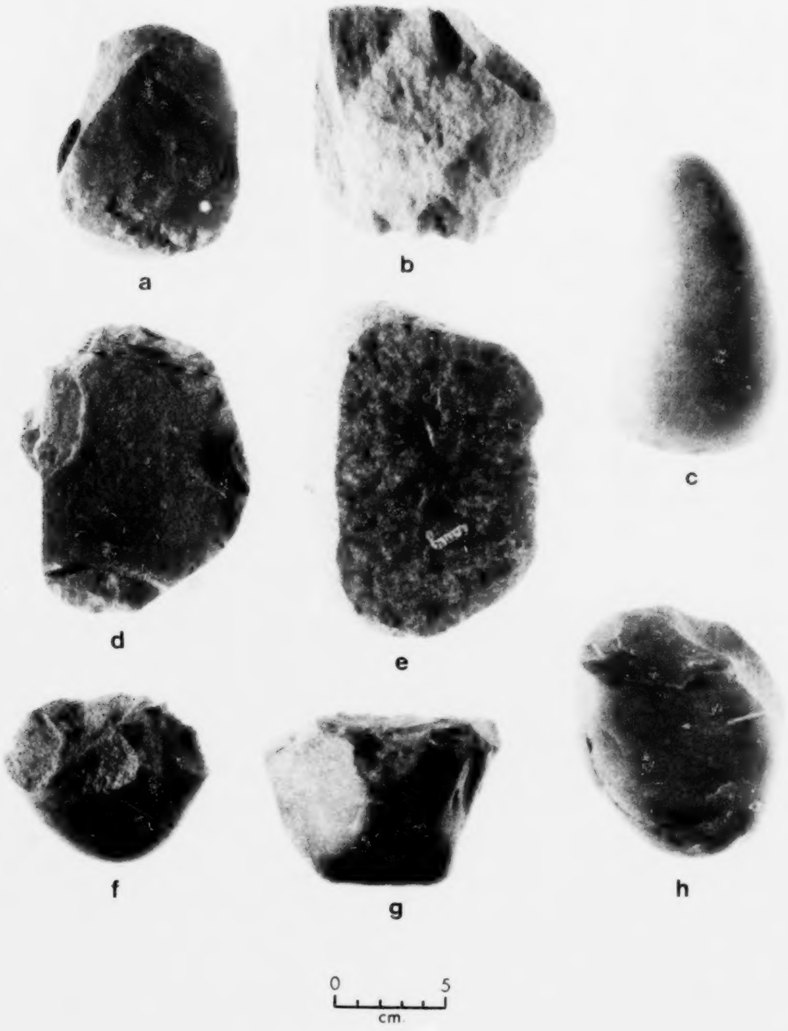
e.
45-OK-250
1198
Chopper/Flake spall
1N23W/40
11
Porphrytic volcanic/Granitic

f.
45-OK-250
210
Chopper
1N22E/100
22
Basalt

g.
45-OK-4
1006
Chopper
10S29E/240
33
Basalt/Quartzite

h.
45-OK-4
918
Chopper
13S13E/30
1
Coarse-grained quartzite

Plate 3-3. Choppers, 45-OK-250 and 45-OK-4.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KEY

Site Number:
Master Number:
Tool Type:
Provenance/Level/Feature
Zone:
Material Type:

a.	45-OK-250	487	Indeterminate	17N28W/150/FE64	13	Graphite/Molybdenite
b.	45-OK-250	22	Indeterminate	Test Pit 2/50B	-	Graphite/Molybdenite
c.	45-OK-4	498	Pendant	7S21E/100	31	Graphite/Molybdenite
d.	45-OK-4	976	Indeterminate	4S24E	31	Coarse-grained quartzite
e.	45-OK-4	524	Indeterminate	13S17E/40	31	Indeterminate
f.	45-OK-250	1879	Siltstone	11S29W/90/FE92	12	Siltstone/mudstone
g.	45-OK-4	476	Adze	6S23E/190/FE31	32	Nephrite
h.	45-OK-4	724	Indeterminate	6S37W/110/FE10	42	Silicized mudstone
i.	45-OK-4	187	Indeterminate	11S11E/130/FE23	32	Indeterminate
j.	45-OK-250	821	Siltstone	3N26W/145/FE7	13	Siltstone/mudstone

BEADS: TOP ROW

a.	45-OK-250	475	9N26W/80	11	Shell
b.	45-OK-250	1432	7S28W/120/FE11	12	Shell
c.	45-OK-250	1803	9S30E/140/FE95	13	Indeterminate
d.	45-OK-250	1892	8S27W/150/FE11	13	Indeterminate
e.	45-OK-250	657	7N28E/180/FE7	13	Calcite
f.	45-OK-250	1833	10S30W/220/FE117	15	Shell
g.	45-OK-4	218	7S41E/250	33	Indeterminate
h.	45-OK-250	626	9N28W/130/FE52	4	Shell
i.	45-OK-250	624	9N26W/110/F82	14	Shell
j.	45-OK-250	1387	6S29W/140/F115	14	Shell
k.	45-OK-250	646	7N28W/120/F7	13	Siltstone/mudstone
l.	45-OK-4	982	5S24E/190/F33	32	Shell

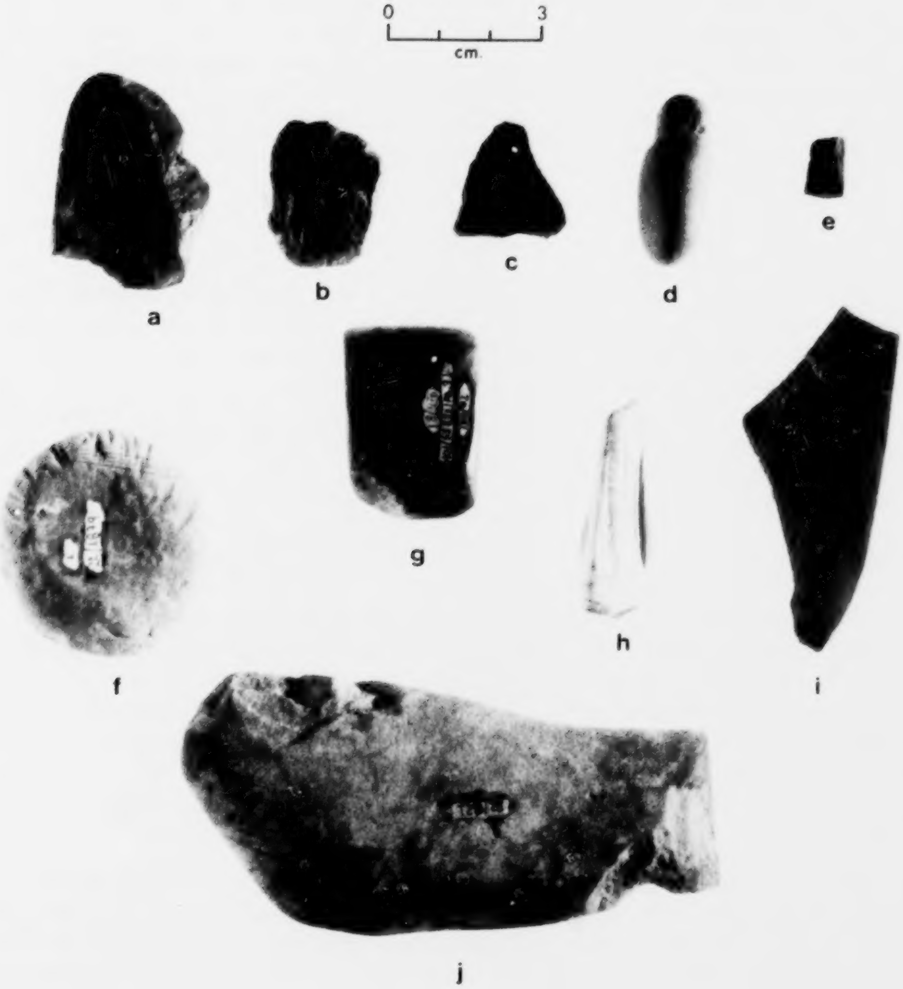
BEADS: MIDDLE ROW

m.	45-OK-250	617	9N28W/80/F28	13	Shell
n.	45-OK-4	220	7S41E/250	33	Indeterminate
o.	45-OK-4	216	7S41E/140/F40	32	Indeterminate
p.	45-OK-250	344	13S35W/190/F97	24	Shell
q.	45-OK-250	798	1N22W/40/F80	11	Bone/antler
r.	45-OK-4	433	4S35E/200/F19	32	Indeterminate
s.	45-OK-4	113	12S18E/130	32	Indeterminate
t.	45-OK-4	124	13S18E/130/F30	32	Indeterminate
u.	45-OK-4	972	9S23E/160	32	Indeterminate
v.	45-OK-4	228	1S30E/150/F20	32	Indeterminate
w.	45-OK-4	117	12S18E/140/F29	32	Indeterminate
x.	45-OK-4	465	9S25E/150/F888	32	Indeterminate
y.	45-OK-250	344	13S35W/190/F97	24	Shell
z.	45-OK-250	1802	9S30E/140/F18	13	Indeterminate

BEADS: BOTTOM ROW

aa.	45-OK-250	1362	5S27W/50	11	Bone/Antler
bb.	45-OK-4	126	13S18E/140/F30	32	Indeterminate
cc.	45-OK-250	1418	7S28W/30	11	Indeterminate
dd.	45-OK-250	334	13S38W/190/F87	23	Indeterminate
ee.	45-OK-250	335	13S36W/190/F87	23	Indeterminate
ff.	45-OK-4	219	7S41E/250	33	Indeterminate
gg.	45-OK-4	125	13S18E/140/F36	32	Indeterminate
hh.	45-OK-250	1377	5S27W/110/F30	13	Indeterminate
ii.	45-OK-250	1374	5S27W/100/FE30	13	Indeterminate
jj.	45-OK-4	231	2S30E/130/FE20	32	Indeterminate
kk.	45-OK-250	888	3N29W/170/FE7	13	Indeterminate
ll.	45-OK-4	870	9S8E/80	31	Indeterminate
mm.	45-OK-250	1205	1N23W/40	13	Basalt
nn.	45-OK-4	232	2S30E/150/FE20	32	Indeterminate
oo.	45-OK-250	724	6S37W/110/FE10	42	Silicized mudstone

Plate 3-4. Pendant, adze, beads, incised siltstone, and other modified objects, 45-OK-250 and 45-OK-4.


0
3
cm.
a
b
c
d
e
f
g
h
i
j

MAUL

In the project classification, mauls are cone- or pear-shaped cobbles used for crushing, grinding and pounding. They are distinguished from pestles by their lack of pecking and grinding shaping modification and their generally larger worn areas. The single maul from Zone 12 shows extensive battering and flaking at one end and battering at the opposing end (Plate 3-5;a). Wear consists of smoothing of a bifacial convex edge and crushing/pecking of a straight terminal surface.

PESTLES

Pestles are elongated cylindrically shaped cobbles often modified by grinding and pecking (Figure 3-14). They are distinguished from mauls by outline and manufacture. Ethnographically, they were used in conjunction with the hopper mortar basket and base to process food.

Wear was not found on all the pestles because of the difficulty of distinguishing it from pecking/grinding manufacture. The complexes recorded include one instance of bifacial smoothing of a convex edge, a crushed/pecked convex terminal surface, and a crushed/pecked straight terminal surface.

HAMMERSTONES

Hammerstones are unmodified hand-sized cobble implements used for percussive activities. The wear may result from pounding stone, bone or wood (Plate 3-6;a,b,d,e). Crushing on convex or straight surfaces occurs on 96.6% of the objects from each site. There are also an abraded straight surface, an abraded convex surface, two smoothed concave surfaces, and one crushed, unifacial convex location.

BEADS

The stone beads are shown in Plate 3-4. Measurements and descriptions are available only for those from 45-OK-4. Here the colors include green, black, brown and light grey. Shapes are short barreled to flat disked. Maximum length is 4.9 mm, minimum length is 1.3 mm. Width maximum and minimum are 7.9 mm and 3.9 mm. The hole diameter ranges from 1.9 to 1.0 mm. The beads each weigh 0.1 gms or less except for one which weighs 0.2 gms.

AMORPHOUSLY FLAKED COBBLE

This category includes cobbles with one or more flakes removed. The purpose of the flake detachment is unclear. One of the artifacts from 45-OK-250 may represent the testing of cobble material. It has several large flake scars removed from the same planar surface. The scars have abrupt terminations suggesting the cobble was rejected for further reduction. The second artifact, also from 45-OK-250, is a five sided prismatic cobble

Figure 3-14. Pestle from Zone 31, 45-OK-4 (Master Number 927, 13S3E/30).

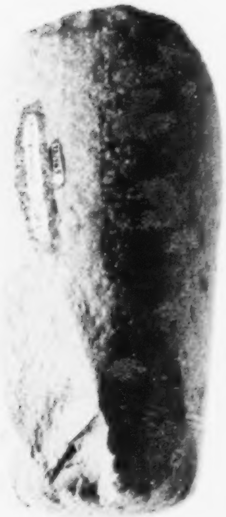
KEY

Site Number:
Master Number:
Tool Type: standard analysis/reanalysis if different
Provenience/Level/Feature:
Zone:
Material: standard analysis/reanalysis if different

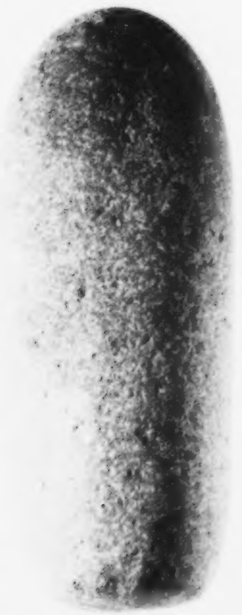
a.	b.
45-OK-250	45-OK-250
465	1046
Maul/Pestle	Pestle
9N26W/60/FE29	2N25W/130/FE7
12	13
Basalt/Other	Porphrytic volcanic

c.	d.	e.
45-OK-4	45-OK-4	45-OK-4
763	764	1057
Indeterminate	Chopper/Indeterminate	Pestle
9S4E/100/FE13	9S4E/100/FE13	Osborne's trench
32	32	-
Basalt	Coarse-grained quartzite/basalt	Quartzite

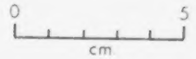
Plate 3-5. Mauls, pestles, and cobble tools, 45-OK-250 and 45-OK-4.



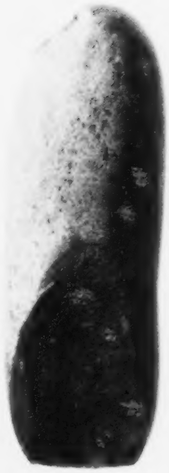
a



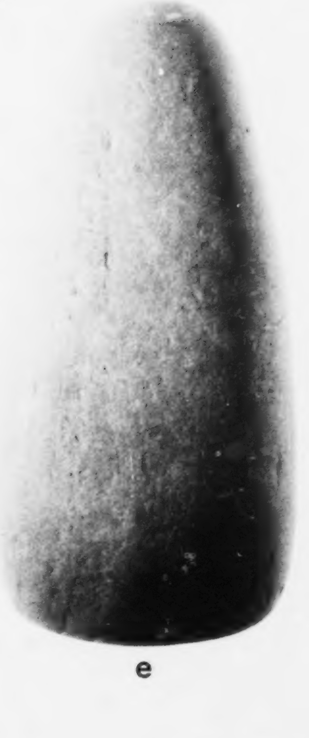
b



c



d



e

KEY
Site Number:
Master Number:
Tool Type:
Provenience/Level/Feature
Zone:
Material:

a.
45-OK-250
1203
Hammerstone
1N23W/70
12
Granitic/Other

b.
45-OK-250
380
Hammerstone
21S51W/110/FE19
22
Fine-grained quartzite/other

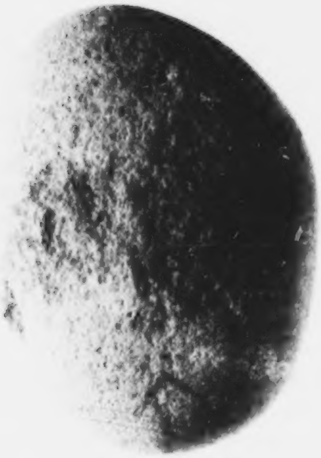
c.
45-OK-250
1832
Amorphously flaked cobble/Indeterminate
10S30W/220/FE117
15
Coarse-grained quartzite/Granitic

d.
45-OK-250
296
Hammerstone
7N38W/140/FE66
22
Basalt

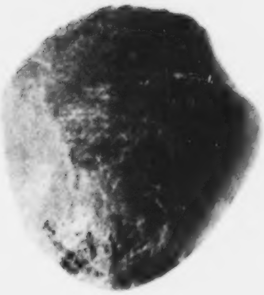
e.
45-OK-4
244
Hammerstone
16S12E/70
32
Coarse-grained quartzite/Granitic

f.
45-OK-250
470
Edge ground cobble
9N26W/70/FE29
12
Porphyritic volcanic/Other

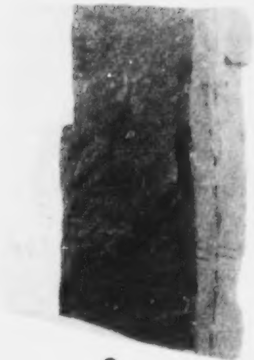
Plate 3-6. Hammerstones and cobble tools, 45-OK-250 and 45-OK-4.



a

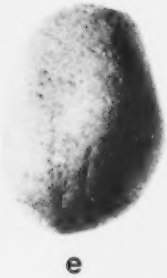


b

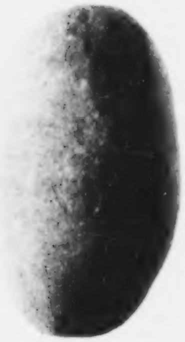


c

d



e



f

fragment (Plate 3-6;e) with a few flakes struck from one edge. It also has a small crushed edge segment and several battered "pock" marks on one planar surface. The third object is a thick cobble spall with distal unifacial retouch. The dorsal platform edge is heavily hinge chipped, but this modification appears to have had little to do with the detachment of the spall. The only wear recorded for the category, smoothing of a convex edge, appears on this object. The wear is quite obvious on the distal retouched edge.

EDGE GROUND COBBLE

Edge ground cobbles are small, flat cobbles with all or part of the periphery showing grinding attrition. A bevelled edge is often formed by the intersection of the two ground facets. The implements' function is uncertain although they have been associated with blade production technology (Crabtree and Swanson 1968) and reduction of basalt. They are considered stylistic markers of Cascade Phase assemblages on the Lower Snake River (Bense 1972:54).

The single edge ground cobble from 45-OK-250 has a ground and battered margin but no angled facet (Plate 3-6;f).

ANVIL

Anvils have been defined as large cobbles with wear on convex surfaces. Used in conjunction with choppers, hammerstones, mauls, and pestles, the rocks served as supports for butchering and processing of food. Wear recorded for the anvils is crushing/pecking of convex surfaces.

MILLINGSTONES

Millingstones have been defined as large flat cobbles with wear on a flat surface. Also included are cobbles collected because of their cultural context; these may have evidence of manufacture, flat surfaces, or residue but lack wear. The presumed functions are similar to those of anvils. Except for one instance of smoothing of a straight surface, all of the wear is crushing/pecking of straight surfaces. These are thus not comparable to Great Basin or Snake River millingstones which show evidence of grinding. They were used for pounding and are thus comparable to hopper mortar bases.The artifacts with no wear or residue, particularly those from housepit floors, may represent furniture rocks.

HOPPER MORTAR BASES

Hopper mortar bases have been defined arbitrarily as large flat cobbles with concave areas of wear. Ethnographically, they were used in association with the bottomless hopper mortar basket and pestle to process food. The wear consisting of crushing/pecking of concave surfaces supports the traditional interpretation.

SHAPED/INCISED SILTSTONE

The objects in this category are white, tan, brown, grey and pink. They appear to be natural concretions and have modification including flaking and striae (Plate 3-4;f,g). Shapes range from elongated flat cylinders to circular forms to various irregular shapes. The largest is about 12 cm in length. Fourteen were found in featured cultural contexts at 45-OK-250, including the housepit floor and exterior contemporary surfaces. The objects may have been pigment sources, decorative items or natural curiosities collected from exposures outcrops of the Nespelem silts.

CORES

Cores are the source of lithic material which is modified into other objects. As previously noted, a core may be diverted at any point from the reduction sequence and used as a tool if it has some characteristic suitable for the task at hand. According to the project classification, an object is considered a core if it exhibits a prepared platform with at least two flakes removed from it. As a consequence, small lithic fragments with only a platform remnant and truncated flake scars have been included. Some of the pieces appear to be fragments of larger objects on which post-breakage flake detachment was attempted. One instance of bifacial crushing of a convex edge was found on a core from 45-OK-250. Such traces could easily result from a misplaced blow. All the cores are small, reflecting the conservative use of conchoidally flaking material at the site.

BURIN AND BURIN SPALLS

Burins are small chisel-like implements derived from flakes, blades or other object types by removing edges parallel to the long axes of the parent objects. Generally, the burin spall is triangular in cross section; its removal leaves a right angle edge. A burin spall removed from a biface edge has two planes retaining surface flake scars and a single smooth plane resulting from detachment. According to this analysis, wear is required on at least one end of the spall for it to be classified as a burin.

The burin from 45-OK-4 has feathered chipping on a point and unifacially on a straight location. The first wear complex is associated with a medium edge angle and the second with a steep edge angle (Table 3-9). The wear may have resulted from the the incising of wood and/or bone, the function usually associated with burins.

BLADE

Blades are parallel-sided flakes with one or two parallel arrises on the dorsal surface. The flakes must be at least twice as long as they are wide and more than 1 cm in width. The single blade from 45-OK-250 has two bifacially feather chipped convex locations and a unifacially hinge chipped convex location.

LINEAR FLAKES

These flakes, like blades, are parallel-sided and twice as long as they are wide. Width, however, is restricted to less than 1 cm. The category was created to identify possible microblades. However, the linear flakes in this assemblage lack the multiple arrises, trapezoidal cross section, and only 90° platform angle characteristic of microblades (Sanger 1969). All are small pressure flakes; the only characteristic that is blade-like is the length to width relationship. In most cases there is a single dorsal ridge, a triangular cross-section and an acute platform angle <60 degrees.

Only one of the flakes from 45-OK-4 shows traces of wear, supporting interpretation of the category as technological rather than functional. The wear is unifacial feathered chipping of two straight locations associated with acute edge angles (Table 3-9).

RESHARPENING FLAKES

This category includes flakes removed from the worn edges of bifacially and unifacially modified implements. The original object's edge was used as the striking platform so that the resulting flake retains portions of the edge and surfaces of the parent object. Although the term implies that resharpening flakes were detached to rejuvenate a worn location, the category also includes unworn bifacial thinning flakes.

Few of these flakes were recovered from 45-OK-4 and only one displays wear. The remaining flakes from 45-OK-250 show primarily unifacial and bifacial feathered and hinged chipping on median and steep angled locations (Table 3-19). Most of the traces could result from manufacture, or accident as well as use.

BIFACIALLY RETOUCHED FLAKES

This category is composed of flakes displaying intentional bifacial modification of an edge. Only 25.0% of the bifacially retouched flakes from 45-OK-250 and 18.1% from 45-OK-4 display wear, suggesting that many are technological by-products (Figure 3-12). It may also be that they have not been used for tasks that produce extensive wear damage, or used long enough to produce detectable wear. There are fewer bifacially retouched flakes and wear locations at 45-OK-4 than at 45-OK-250 (Table 3-20), and comparatively restricted wear complexes (the majority have hinged chipping on unifacial and bifacial locations). The 45-OK-250 examples have more feathered chipping. Angles at both sites are medium and steep.

Again, manufacturing processes probably are responsible for a portion of the traces detected. The prominence of unifacial wear associated with medium angles suggests scraping use. Bifacial attrition suggests cutting as a secondary use.

Table 3-19. Kind of wear, location of wear, and shape of worn area for resharpening flakes by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Smoothing 10.0	-	Unifacial 10.0	-	Convex 10.0	-	-	-	2	-	-	-	2	-
Feathered Chipping 65.0	100.0	Unifacial 50.0	100.0	Convex 25.0	100.0	1	-	4	1	-	-	5	1
				Concave 10.0	-	1	-	1	-	-	-	2	-
				Straight 15.0	-	-	-	3	-	-	-	3	-
		Bifacial		Convex		2	-	1	-	-	-	3	-
Hinged Chipping 25.0	-	Unifacial 200.0	-	Convex 15.0	-	2	-	1	-	-	-	3	-
				Straight 5.0	-	-	-	1	-	-	-	1	-
		Bifacial 5.0	-	Straight 5.0	-	-	-	1	-	-	-	1	-
Total N						7	-	13	1	-	-	20	1

Table 3-20. Kind of wear, location of wear area for bifacially retouched flakes by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding 4.-	-	Bifacial 4.0	-	Convex 4.0	-	-	-	1	-	-	-	1	-
Smoothing 12.0	-	Edge 4.0	-	Straight 4.0	-	-	-	1	-	-		1	-
		Unifacial 4.0	-	Convex 4.0	15-0	-	-	1	-	-	-	1	-
		Bifacial 4.0	-	Convex 4.0	-	1	-	-	-	-	-	1	-
Crushing/Pecking -	9.1	Unifacial 7		Convex -	9.1	-	-	-	1	-	-	-	1
Feathered Chipping 56.0	9.1	Unifacial 44.0	9.1	Convex 24.0	9.1	3	1	3	-	-	-	6	1
				Concave 8.0	-	2	-	-	-	-	-	2	-
				Straight 12.0	-	1	-	2	-	-	-	3	-
		Bifacial 12.0	-	Convex 8.0	-	1	-	1	-	-	-	2	-
				Straight 4.0	-	-	-	1	-	-	-	1	-
Hinged Chipping 20.0	81.8	Unifacial 24.0	45.5	Convex 4.0	9.1	1	1	-	-	-	-	1	1
				Concave -	18.2	-	2	-	-	-	-	-	2
				Straight 20.0	18.2	1	2	4	-	-	-	5	2
		Bifacial 4.0	36.4	Convex 4.0	-	1	-	-	-	-	-	1	-
				Straight -	36.4	-	3	-	1	-	-	-	4
Total N						11	9	14	2	-	-	25	11

UNIFACIALLY RETOUCHED FLAKES

These artifacts differ from the bifacially retouched flakes in that their modifications are unifacial. About three times as many unifacially as bifacially retouched flakes have wear suggesting that functional traces are less likely to have resulted from manufacture than in the previous category (Figure 3-12). The wear complexes are similar to those of the bifacially retouched flakes (Table 3-21). At 45-OK-4 hinged chipping on unifacial and bifacial locations predominates. Notably more of the wear is unifacial. The most frequent wear at 45-OK-250 is feathered chipping with diversity of additional complexes. There are more steep edge angles at 45-OK-250 and fewer acute angles 45-OK-4.

The unifacial wear complexes, the medium edge angles, and the infrequent bifacial damage suggest use mainly for scraping. Working of a harder material such as wood or bone may have been more common at 45-OK-4, accounting for the higher proportion of hinged chipping.

UTILIZED FLAKES

This category includes flakes which show evidence of use damage, but no sign of intentional modification. The flakes were used for any purpose for which their characteristics made them suitable.

Of all the worn debitage, utilized flakes show the most similarity in wear complexes between the two sites. The same kinds of wear occur; the greatest proportion is unifacial feathered chipping on convex and straight locations (Table 3-22). Utilized flakes at 45-OK-4 show more hinged chipping and more acute edge angles. However, both collections have primarily medium and acute angles.

Although some of the wear probably resulted from manufacture and accidental damage, its uniformity suggests a regular function; the unifacial position and feathered chipping suggest light scraping while the acute edge angles suggest cutting.

INDETERMINATES

This category includes objects of diverse form and often uncertain function. Some of the more interesting artifacts include two pieces of graphite/molybdenite from 45-OK-250 displaying deep striae (Plate 3-4;a,b). Further modification may have been intended to form a pendant similar to the one from 45-OK-4 (Plate 3-4;c). Other objects of uncertain function from cultural contexts are two quartz crystals, one rose-colored the other clear from Zone 52, 45-OK-204, and three small (<3.0 cm) oddly shaped pebbles from Zone 51 at both sites (Plate 3-4;d). Five small pebble fragments and irregularly shaped basalt or quartzite flakes with red and yellow-brown pigment residues on one surface were found in each zone at 45-OK-4. They are most often split, smooth pebbles, with pigment on the freshly broken, rough surface. Two small sandstone fragments with convex-concave cross sections were found in Zones 51 and 52, 45-OK-4. They may represent fragments of pipe

Table 3-21. Kind of wear, location of wear, and shape of worn area for unifacially retouched flakes by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding 1.6	1.5	Unifacial 1.6	1.5	Convex 0.8	1.5	-	1	-	-	1	-	1	1
				Straight 0.8	-	1	-	-	-	-	-	1	-
Smoothing 14.5	4.4	Unifacial 11.3	4.4	Convex 8.9	4.4	1	1	9	1	1	1	11	3
				Concave 0.8		-	-	1	-	-	-	1	-
				Straight 1.6		1	-	1	-	-	-	2	-
		Bifacial 2.4	-	Convex 0.8	-	1	-	-	-	-	-	1	-
				Straight 1.6	-	1	-	1	-	-		2	-
		Point 0.9	-	Point 0.8	-	1	-	-	-	-	-	1	-
Feathered Chipping 50.0	23.5	Unifacial 41.2	20.6	Convex 21.0	7.4	13	1	12	3	1	1	26	5
				Concave 8.1	4.4	4	2	6	1	-	-	10	3
				Straight 12.1	8.8	9	2	6	4	-	-	15	6
		Bifacial 8.8	2.9	Convex 2.4		-	-	3	-	-	-	3	-
				Concave 1.6	-	1	-	1	-	-	-	2	-
				Straight 4.8	2.9	3	2	3	-	-	-	6	2
Hinged Chipping 33.8	70.5	Unifacial 33.0	66.1	Convex 20.2	25.0	12	7	13	10	-	-	25	17
				Concave 3.1	17.6	2	6	1	6	1	-	4	12
				Straight 9.7	23.5	6	3	6	13	-	-	12	16
		Bifacial 0.8	4.4	Convex -	1.5	-	1	-	-	-	-	-	1
				Straight 0.8	2.9	-	2	1	-	-	-	1	2
Total N						56	28	64	38	4	2	124	68

Table 3-22. Kind of wear, location of wear, and shape of worm area for utilized flakes by zone, 45-OK-250 and 45-OK-4.

Wear Complex						Zone						Total	
Kind of Wear		Location of Wear		Shape of Worn Area		51		52		53			
45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Abrasion/Grinding 0.2	0.9	Unifacial 0.2	0.9	Convex 0.2	0.9	-	2	1	-	-	-	1	2
Smoothing 3.7	1.0	Unifacial 3.2	1.0	Convex 1.4	-	4	-	2	-	-	-	6	-
				Concave 0.2	0.5	-	1	1	-	-	-	1	1
				Straight 1.6	0.5	3	1	4	-	-	-	7	1
		Bifacial 0.5	-	Convex 0.5	-	-	-	2	-	-	-	2	-
Crushing/Packing 0.7	1.0	Unifacial -	1.0	Convex -	0.5	-	1	-	-	-	-	-	1
				Straight -	0.5	-	1	-	-	-	-	-	1
		Bifacial 0.7	-	Convex 0.7	-	-	-	3	-	-	-	3	-
Feathered Chipping 82.6	72.8	Unifacial 72.8	62.8	Convex 24.1	17.6	36	17	68	21	1	1	105	39
				Concave 14.7	14.9	23	12	39	20	2	1	64	33
				Straight 34.0	29.4	54	28	86	33	8	4	148	65
				Irregular -	0.9	-	2	-	-	-	-	-	2
				3.0	4.5								

Table 3-22. Cont'd.

Wear Complex									Zone						Total	
Kind of Wear			Location of Wear			Shape of Worn Area			51		52		53			
	45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %		45-OK-250 %	45-OK-4 %	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N
Hinged Chipping	12.6	24.6	Bifacial	9.8	9.5	Convex	4.8	3.6	9	3	12	4	-	1	21	8
						Concave	1.8	0.5	2	1	4	-	2	-	8	1
						Straight	3.2	5.4	2	5	12	7	-	-	14	12
			Point	-	-	Point	-	0.5	-	-	-	1	-	-	-	1
			Unifacial	11.0	21.3	Convex	4.8	3.2	6	4	15	5	-	-	13	10
						Concave			3	5	10	5	-	-	13	10
						Straight	3.2	12.7	5	13	8	12	1	3	14	28
						Irregular	-	0.9	-	2	-	-	-	-	-	2
			Bifacial	1.6	3.3	Convex	0.7	0.5	3	1	-	-	-	-	3	1
						Concave	-	0.5	-	-	-	1	-	-	-	1
						Straight	0.9	2.3	2	1	1	3	1	1	4	5
Total N									152	100	268	109	15	11	435	221

bowls; however, their small size and indistinct modification make this uncertain. Five objects, one from Zone 53, 45-OK-250, and four from Zone 52, 45-OK-4, are elongated, longitudinally split, small cobbles which may be split pestles or the product of bipolar blows (Plate 3-5;c). Several cobble fragments from Zone 52, 45-OK-4, have a single specimen number and are pieces of the same anvil stone. A small flat pebble with surface striations from Zones 51, 45-OK-4, may have served as a whetstone (Plate 3-4;i). A similar pebble with no apparent surface modification was found in the same unit separated by 20 cm of matrix. A small cobble with deep striae may have served as a support for cutting activities or as a whetstone was found in Zone 51, 45-OK-250. This object has traces of dark brown unidentified residue on its surface. Several other indeterminate objects and some of the classified large support stones also display similar residue traces. Two small, irregularly shaped incised pieces of indeterminate sedimentary material were found in Zones 51 and 52, 45-OK-4, also may have been whetstones (Plate 3-4;h). An object of similar material from Zone 52, 45-OK-250, was included in the shaped/incised siltstone category. There is also a small cobble fragment with concentric rings on a cortex surface which appear to be the print of a basket base. Finally a small, flat, rectangular object with opposing incised notches was found in Zone 52, 45-OK-4 (Plate 3-4;e).

Most of the cobble artifacts in this category were re-examined in the cobble classification which identified some as other kinds of tools. Most, however, remained in the indeterminate category.

COBBLE TOOL ANALYSIS

In addition to the project's standardized functional and technological analyses, the cobble tools from 45-OK-250 and 45-OK-4 were subjected to an analysis developed for artifacts from 45-OK-11. At that site the lower, Kartar Phase component was characterized by a distinctive cobble tool industry showing extensive wear attrition and manufacture. In this use of the analysis, we provide the comparison of Hudnut Phase cobble assemblages from Zone 52 at 45-OK-250 and 45-OK-4. The 45-OK-11 data also allows us to compare a Hudnut Phase non-village component. The intersite comparison should highlight both cultural changes in the use of the artifacts between the phases and the range of variability possible within a single phase.

The cobble tool discussion is based on a paradigmatic classification similar to that just presented for analysis of lithic objects. A complete list of dimensions and variables is included in Appendix B, Table B-19. The variables discussed here are those discussed in the 45-OK-11 report (Lohse, 1984f): object type, material type, manufacture, diagnostic of manufacture, kind of wear and location of wear in relation to manufacture.

Table 3-23 presents the cobble object type by material type. The Hudnut Phase components at each site show similar proportions of materials with granite most common followed by basalt, other and quartzite. Variation at 45-OK-250 include greater use of basalt and granitic materials and of quartzite at 45-OK-4. Similar kinds of objects occur at both sites and certain material types are associated with certain tools. Support stones, anvils,

Table 3-23. Cobble object type by material type, 45-OK-250 and 45-OK-4.

Material	Zone	Site	Abrader	Amorphously Flaked Cobble	Anvil	Chopper	Utilized Flake/Spall	Hammerstone	Pestle	Millingstone	Mortar	Edge Ground Cobble	Hopper Mortar Base	Indeterminate	Total N	Total %
Basalt	51	45-OK-250	-		3		3	4	1	-	1	-	1	1	14	15.6
		45-OK-4	-	-	1				-		-		1	3	5	6.4
	52	45-OK-250	-	-	2	4	2	5	1				-		14	15.6
		45-OK-4		-	1	2	3	5	-	1			-	3	15	19.2
	53	45-OK-250		-					-	-			-	-		
		45-OK-4											-			
Quartzite	51	45-OK-250	-	-	-		1	1					-		2	2.2
		45-OK-4		-	-	2	3	1		-			-	-	6	7.7
	52	45-OK-250	-	-	-	2	3	-					-	-	5	5.6
		45-OK-4	-	-	-	3	1	2		-			-	-	6	7.7
	53	45-OK-250	-	-	-	-	-			-	-		-	-	-	-
		45-OK-4	-	-	-	1	3			-	-		-	-	4	5.1
Granitic	51	45-OK-250	-	-	2	-	2	3	-	1			-	-	8	8.9
		45-OK-4	-	-	-	-	1	1				-	-	-	2	2.6
	52	45-OK-250	-	-	8	-		11	-	2	-		2	1	24	26.7
		45-OK-4	-	-	4	-		10	-	1	-		4	1	20	25.6
	53	45-OK-250	-	1	1	-		-		-	-		1	-	3	3.3
		45-OK-4	-	-	-	-	-	1		-	-		-		1	1.3
Porphyritic	51	45-OK-250	-	-	-					-	-		-		-	-
		45-OK-4	-	-	-		-	1			-		-		1	1.3
	52	45-OK-250	-	-	-		-		1				-		1	1.1
		45-OK-4	-	-	-		-	2	-				-		2	2.6
	53	45-OK-250	-	-	-	-	-		-	-			-	-	-	-
		45-OK-4	-	-		-	-	-	-		-	-	-	-	-	-
Other	51	45-OK-250	-	-			1	2	1	-	-	1	-	-	5	5.6
		45-OK-4	-	-	-	1	1	-	-			-	-	-	2	2.6
	52	45-OK-250	-	-	2	-		7	-	4	-		-		13	14.4
		45-OK-4	1	-	-			11	-	-	-	-	-	2	14	17.9
	53	45-OK-250	-	-							-		-	1	1	1.1
		45-OK-4	-	-	-					-	-		-	-	-	-
Total		45-OK-250	-	1	18	6	12	33	4	7	1	1	4	3	90	100.0
		45-OK-4	1	-	6	9	12	34	-	2	-	-	5	8	78	100.0

millingstones, mortars and hopper mortar bases are made of granite or basalt. Utilized flake/spalls and choppers are, for the most part, basalt or quartzite. Hammerstones show the widest range of material types, suggesting little specialization in this aspect of their selection.

Table 3-24 presents the cobble object type by the type of manufacture. Most of the objects show no manufacture. Most of the manufacture consists of flaked edges of choppers and utilized flakes and spalls. The pestles are more carefully shaped by pecking of the margins and ends. Flaking of the margins of an anvil, millingstone and hopper mortar base may represent individual customizing of these objects.

Most of the flaking is unifacial (Table 3-25). Utilized flakes and spalls show equal frequencies of unifacial and bifacial manufacture. The pecking almost always forms facets or occurs on convex surfaces.

Most of the objects have a diversity of kinds of wear, little of which presents unexpected associations (Table 3-26). Reflecting the general lack of manufacture, most of the locations are not applicable/indeterminate. The exceptions are the choppers and utilized flakes and flake spalls which have wear associated with modified edges.

The new classification of the support stones is of interest. In the standardized project analysis anvils, millingstones and hopper mortar bases were distinquished primarily on the basis of surface shape. In the second analysis, the criteria were modified: anvils had crushing and pecking, ranging from semi-diffuse areas of concentration to sporadic battering with no required surface shape; millingstones were required to show grinding wear on a flat to slightly concave surface; mortars were defined by the presence of a natural or manufactured well on one surface with grinding wear or residue present; hopper mortar bases were defined by the presence of intense crushing and grinding wear restricted to a circular area on one surface. Reanalysis resulted in many more anvils and fewer millingstones and hopper mortar bases than in the first classification (Table 3-1).

Figure 3-15 presents the distribution of material types among collections from 45-OK-11, 45-OK-250, and 45-OK-4. More basalt and quartzite appear in the Kartar Phase component from 45-OK-11, while more granite appears in the Hudnut Phase cobble assemblages. The difference in the proportions of basalt betwen the Kartar and Hudnut components at 45-OK-11 is greater than the difference between the Kartar Phase of 45-OK-11 and the Hudnut Phase components of 45-OK-250 and 45-OK-4.

There are few differences between the phases in the kinds of objects found at each site (see totals, Table 3-23). The Kartar Phase has a greater proportion of choppers and a smaller proportion of hammerstones and support stones. Among the Hudnut components the proportion of support stones varies. The housepit assemblages of 45-OK-250 and 45-OK-4 have more anvils, millingstones and hopper mortar bases than the 45-OK-11 Hudnut component. 45-OK-250 has the greatest proportion of anvils. The 45-OK-11 Hudnut component has a greater proportion of choppers than either of the other Hudnut collections. This variation of choppers and support stones may be a reflection of difference in site function and economic focus. The more permanent 45-OK-250 and 45-OK-4 settlements have more of the heavier,

Table 3-24. Cobble object type by type of manufacture by zone, 45-OK-250 and 45-OK-4.

Type of Manufacture	Zone	Site	Abrader	Amorphously Flaked Cobble	Anvil	Chopper	Utilized Flake/Spall	Hammerstone	Pestle	Millingstone	Mortar	Edge-Ground Cobble	Hopper Mortar Base	Indeterminate	Total N	Total %
Flaked surface	51	45-OK-4	-	-	-	1	-	-	-	-	-	-	-	-	1	0.9
Flaked edge/ margin	51	45-OK-250	-	-	-	-	2	-	-	-	-	-	-	-	2	2.0
		45-OK-4	-	-	-	4	-	-	-	-	-	-	-	-	4	3.8
	52	45-OK-250	-	-	-	6	2	-	-	-	-	-	-	-	8	7.9
		45-OK-4	-	-	-	5	3	1	-	1	-	-	1	2	13	12.4
	53	45-OK-250	-	1	-	-	-	-	-	-	-	-	-	-	1	1.0
		45-OK-4	-	-	-	1	2	-	-	-	-	-	-	-	3	2.9
Pecked surface	51	45-OK-250	-	-	-	-	-	-	2	1	-	-	-	-	3	3.0
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	0.9
	52	45-OK-250	-	-	-	-	-	-	2	-	-	-	-	-	2	2.0
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	2	2	1.9
Pecked edge/ margin	51	45-OK-250	-	-	-	-	-	1	-	-	-	1	-	-	2	2.0
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	0.9
	52	45-OK-250	-	-	-	-	-	-	1	-	-	-	-	-	1	1.0
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	2	2	1.9
Pecked end	51	45-OK-250	-	-	-	-	-	-	2	-	-	-	-	-	2	2.0
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	0.9
	52	45-OK-250	-	-	-	-	-	-	1	-	-	-	-	-	1	1.0
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	0.9
None	51	45-OK-250	-	-	6	-	7	8	1	-	1	-	-	1	24	23.8
		45-OK-4	-	-	1	4	6	3	-	-	-	-	1	3	18	17.1
	52	45-OK-250	-	-	12	2	3	24	1	6	-	-	3	1	52	51.5
		45-OK-4	1	-	5	1	3	36	-	2	-	-	3	5	56	52.5
	53	45-OK-250	-	-	1	-	-	-	-	-	-	-	1	1	3	3.0
		45-OK-4	-	-	-	-	1	1	-	-	-	-	-	-	2	1.9
Total		45-OK-250	-	1	19	8	14	33	10	7	1	1	4	3	101	100.0
		45-OK-4	1	-	6	16	15	41	-	3	-	-	5	18	105	100.0

Table 3-25. Cobble object type by diagnostic of manufacture by zone, 45-OK-250 and 45-OK-4.

Diagnostic of Manufacture	Zone	Site	Abrader	Amorphously Flaked Cobble	Anvil	Chopper	Utilized Flake/Spall	Hammerstone	Pestle	Millingstone	Mortar	Edge-Ground Cobble	Hopper Mortar Base	Indeterminate	Total N	Total %
Unifacial edge	51	45-OK-4	-	-	-	2	-	-	-	-	-	-	-	-	2	2.0
	52	45-OK-250	-	-	-	6	-	-	-	-	-	-	-	-	6	5.8
		45-OK-4	-	-	-	4	2	-	-	1	-	-	1	1	9	9.2
	53	45-OK-4	-	-	-	1	2	-	-	-	-	-	-	-	3	2.9
Bifacial edge	51	45-OK-250	-	-	-	-	3	-	-	-	-	-	-	-	3	3.1
		45-OK-4	-	-	-	2	-	-	-	-	-	-	-	-	2	2.0
	52	45-OK-250	-	1	-	-	1	-	-	-	-	-	-	-	2	1.9
		45-OK-4	-	-	-	1	1	1	-	-	-	-	-	1	4	4.1
Facet	51	45-OK-250	-	-	-	-	-	1	1	1	-	1	-	-	4	3.8
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	1.0
	52	45-OK-250	-	-	-	-	-	-	3	-	-	-	-	-	3	3.1
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	1.0
Convex surface	51	45-OK-250	-	-	-	-	-	-	1	-	-	-	-	-	1	1.0
	52	45-OK-250	-	-	-	-	-	-	2	-	-	-	-	-	2	1.9
		45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	1.0
Flat surface	52	45-OK-4	-	-	-	-	-	-	-	-	-	-	-	1	1	1.0
None	51	45-OK-250	-	-	6	-	7	8	2	-	1	-	-	1	25	24.0
		45-OK-4	-	-	1	4	6	3	-	-	-	-	1	2	17	17.3
	52	45-OK-250	-	-	12	2	4	24	1	6	-	-	3	1	53	51.0
		45-OK-4	1	-	5	1	3	36	-	2	-	-	3	5	56	57.1
	53	45-OK-250	-	-	1	-	-	-	-	-	-	-	1	1	3	3.1
		45-OK-4	-	-	-	-	1	1	-	-	-	-	-	-	2	2.0
Total		45-OK-250	-	1	19	10	15	33	10	7	1	1	4	3	104	100.0
		45-OK-4	1	-	6	15	14	41	-	3	-	-	5	13	98	100.0

Table 3-26. Cobble object type by kind of wear and location of wear by zone, 45-OK-250 and 45-OK-4.

Object Type	Wear Complex		Zone 51		Zone 52		Zone 53		Total			
	Kind of Wear	Location of Wear	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	%	45-OK-4 N	%
Abrader	Abrasion	NA/Indeterminate	-	-	-	1	-	-	-	-	1	100.0
Anvil	Smoothed	NA/Indeterminate	-	-	-	1	-	-	-	-	1	9.1
	Battered	NA/Indeterminate	4	1	7	3	-	-	11	47.8	4	36.4
	Crushed	NA/Indeterimate	2	1	7	4	1	1	10	43.4	5	45.5
	Abrasion	NA/Indeterminate	1	-	1	-	-	-	2	8.7	-	-
Chopper	Smoothed	Lateral edge	-	-	1	-	-	-	1	9.0	-	-
		NA/Indeterminate	-	1	-	-	-	-	-	-	1	6.3
	Battered	Distal edge	-	-	-	-	-	1	-	-	1	6.3
		Separate	-	-	1	-	-	-	1	9.0	-	-
		NA/INdeterimate	-	-	2	-	-	-	2	18.2	-	-
	Crushing	Distal edge	2	3	2	2	-	-	4	36.4	5	31.3
		NA/Indeterimnate	-	2	-	-	-	-	-	-	2	-
	Abrasion	NA/Indeterminate	-	2	1	-	-	-	1	9.0	2	12.5
	Flaked	Distal edge	-	1	-	-	-	-	-	-	1	6.3
	None	NA/Indeterminate	-	1	2	3	-	-	2	18.2	4	25.0
Flake spall/ utilized flake	Smoothed	NA/Indeterminate	-	-	-	1	-	-	-	-	1	4.8
	Battered	NA/Indeterminate	1	-	-	1	-	-	1	4.0	1	4.8
	Crushed	Distal edge	2	-	2	2	-	-	4	16.0	2	9.5
		Separate	-	-	1	1	-	-	1	4.0	1	4.8
		NA/Indeterimate	7	5	3	2	-	-	10	40.0	7	33.3
	Abrasion	NA/Indeterminate	-	-	1	1	-	-	1	4.0	1	4.8
	Flaked	Distal edge	1	-	-	-	-	-	1	4.0	-	-
		NA/Indeterminate	4	4	2	-	-	1	6	24.0	5	23.8
	None	-	-	1	1	-	-	2	1	4.0	3	14.3

Table 3-26. Cont'd.

Object Type	Wear Complex		Zone 51		Zone 52		Zone 53		Total			
	Kind of Wear	Location of Wear	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-250 %	45-OK-4 N	45-OK-4 %
Hopper mortar base	Battered	NA/Indeterminate	-	-	1	1	-	-	1	20.0	1	14.3
	Crushing	Separate	-	-	-	1	-	-	-	-	1	14.3
		NA/Indeterminate	-	-	2	3	1	-	3	60.0	3	42.9
	Abrasion	NA/Indeterminate	-	-	1	-	-	-	1	20.0	-	-
	Grinding	NA/Indeterminate	-	-	-	1	-	-	-	-	-	14.3
	None	-	-	1	-	-	-	-	-	-	1	14.3
Edge-ground cobble	Crushing	All facets	1	-	-	-	-	-	1	50.0	-	-
	Grinding	All facets	1	-	-	-	-	-	1	50.0	-	-
Amorphously flaked cobble	none	-	-	-	-	-	1	-	1	100.0	-	-
Indeterminate	Smoothing	Distal edge	-	-	-	1	-	-	-	-	1	4.8
		Separate	-	1	-	-	-	-	-	-	1	4.8
		All facets	-	1	-	-	-	-	-	-	1	4.8
		NA/Indeterminate	-	-	-	2	-	-	-	-	2	9.5
	Battered	Distal edge	-	-	-	1	-	-	-	-	1	4.8
	Crushed	Separate	-	1	-	-	-	-	-	-	1	4.8
		All facets	-	1	-	1	-	-	-	-	2	9.5
		NA/Indeterminate	-	-	1	1	-	-	1	33.3	1	4.8
	Abrasion	Separate	-	1	-	-	-	-	-	-	1	4.8
		All facets	-	1	-	-	-	-	-	-	1	4.8
		NA/Indeterminate	1	-	-	-	1	-	2	66.7	-	-
	Grinding	Separate	-	1	-	-	-	-	-	-	1	4.8
		All facets	-	1	-	1	-	-	-	-	2	9.5
	Flaked	NA/Indeterminate	-	-	-	1	-	-	-	-	1	4.8
	None	-	-	2	-	4	-	-	-	-	6	28.6
	Indeterminate	-	-	1	-	-	-	-	-	-	1	4.8
Total			45	38	86	89	4	5	135	100.0	132	100.0

Table 3-26. Cont'd.

Object Type	Wear Complex		Zone 51		Zone 52		Zone 53		Total			
	Kind of Wear	Location of Wear	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	45-OK-4 N	45-OK-250 N	%	45-OK-4 N	%
Hammerstone	Polish	NA/Indeterminate	–	–	–	1	–	–	–	–	1	2.2
	Smoothed	All facets	1	–	–	1	–	–	1	2.4	–	–
		NA/Indeterminate	–	–	–	1	–	–	–	–	1	2.2
	Battered	Distal edge	–	–	–	1	–	–	–	–	1	2.2
		Lateral edge	–	–	–	1	–	–	–	–	1	2.2
		NA/Indeterminate	2	–	14	12	–	1	16	38.1	13	28.3
	Crushing	All facets	1	–	–	–	–	–	1	2.4	–	–
		NA/Indeterminate	7	3	16	25	–	–	23	54.8	28	60.9
	Grinding	All facets	1	–	–	–	–	–	1	2.4	–	–
		NA/Indeterminate	–	–	–	1	–	–	–	–	1	2.2
Pestle	Polish	NA/Indeterminate	1	–	–	–	–	–	1	8.3	–	–
	Smoothing	All facets	–	–	1	–	–	–	1	8.3	–	–
		NA/Indeterminate	1	–	–	–	–	–	1	8.3	–	–
	Crushing	All facets	–	–	1	–	–	–	1	8.3	–	–
		NA/Indeterminate	–	–	1	–	–	–	1	8.3	–	–
	Abrasion	NA/Indeterminate	1	–	–	–	–	–	1	8.3	–	–
	Grinding	All facets	1	–	2	–	–	–	3	25.0	–	–
	Flaked	All facets	1	–	–	–	–	–	1	8.3	1	–
	None	–	1	–	–	–	–	–	1	8.3	–	–
	Indeterminate	–	–	–	1	–	–	–	1	8.3	–	–
Millingstone	Battered	NA/Indeterminate	–	–	–	1	–	–	–	–	1	20.0
	Crushing	NA/Indeterminate	–	–	3	2	–	–	3	30.0	2	40.0
	Abrasion	NA/Indeterminate	–	–	2	1	–	–	2	20.0	1	20.0
	Grinding	All facets	1	–	–	–	–	–	1	10.0	–	–
		NA/Indeterminate	–	–	1	–	–	–	1	10.0	–	–
	None	–										
Mortar	Crushing	NA/Indeterminate	1	–	–	–	–	–	1	100.0	–	–

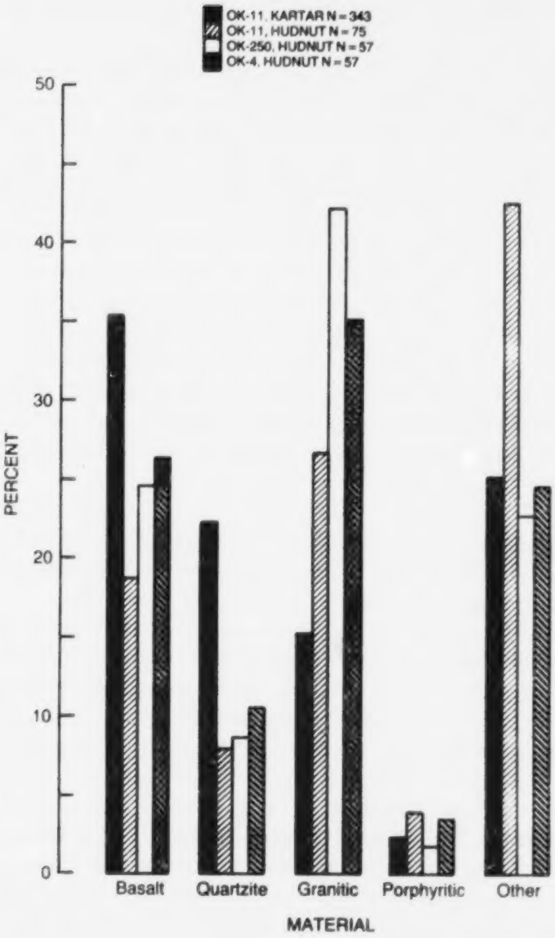


Figure 3-15. Proportion of cobble material types among sites; 45-OK-11, 45-OK-250 and 45-OK-11.

ensconced food processing bases and fewer tools used for primary disarticulation. Portable tools and tools used for initial butchering should be found at open, transitory camps such as those of the 45-OK-11 Hudnut component.

The majority of the cobble objects in all components show no manufacture. Formation of flaked unifacial edges, primarily on choppers, is the major modification (Lohse 1984f). Most cobbles were either utilized as found as in the case of hammerstones, or reduced to steep unifacial edges for chopping and cutting.

The kinds of wear associated with the object types in each component are similar (Lohse 1984f). The most pronounced contrast among the components appears in the locations of wear found on choppers from the Kartar Phase:

> Specimens have wear all along flaked margins; wear extending past areas of flaking onto adjoining surfaces; instances of battering on an end completely separated from the flaked edges; and, perhaps most perplexing, areas of grinding and abrasion at the dorsal end of flake scars, where these terminate at the intact surface of the cobble, well away from the sharp unifacial or bifacial edge. Several also have grinding or abrasion extending up arrises, following the margins of flake scars on one unifacial surface, overlapping onto the surface itself, but not extending onto the flaked edge which shows expected crushing and battering (Lohse 1984f).

Similar patterns, though not as extreme in diversity, appear on the Kartar Phase hammerstones. The cobbles appear to have had extreme variablity in function in this phase.

Despite the small sample sizes, the Hudnut components do not have this diversity in wear locations. For the most part, damage expected to be associated with an object type is found. For example, the choppers at 45-OK-250 and 45-OK-4 show primarily battering and crushing associated with either a modified edge or an edge formed by the breaking of a cobble with no further modification.

A larger, more varied cobble tool assemblage has been cited as a characteristic of the Kartar Phase (Lohse 1984f). We have demonstrated that the contrast between cobble tool assemblages from the Kartar and Hudnut phases includes differences in raw material, proportion of tools types, and extent and location of wear as well as assemblage size. The contrast distinguishes the phases, but its significance is difficult to interpret in association with other available data (see synthesis chapter for discussion).

NON-LITHIC ARTIFACTS

Table 3-27 presents the distribution of bone artifacts by zone. Most of the bones are fragments with striae, cut marks, flaking, polish or abrasion. Those artifacts complete enough to be more precisely classified are discussed below. Examples are illustrated in Plates 3-4 and 3-7 and in Figures 3-16 and 3-17.

Bone and shell beads are illustrated in Plate 3-4. Two shell disc beads from 45-OK-250 (Plate 3-4) are manufactured from California mussel (*Mytilus californicus*), a bivalve which occurs in the intertidal zone along open coastline from Alaska to Baja California (Quayle 1960). The type of shell used for the other disc beads is unknown. We can include the dentalia and olivella shell in the bead category as well. It is difficult to discern modification on them, but they are easily strung in any case. Their decorative function as demonstrated by the recovery of a dentalium with a basalt bead wedged within it. *Dentalium pretiosum*, a scaphopod, inhabits open water from the low tide level to several fathoms in depth, from Alaska to Baja California (Morris 1966). The organism has an external tubular shell, tapered and slightly curved, which is open at both ends. Two species of Olivella, *O. biplicata* and *O. boetica*, occur on sandy beachs on open coastlines and in sounds (Griffith 1967).

Table 3-27. Non-lithic artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type	Zone 51		Zone 52		Zone 53		Total	
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4
Bone Bead	2	-	-	-	-	-	2	-
Shell Bead	2	-	4	1	2	-	8	1
Barbed harpoon point	-	-	1	-	-	-	1	-
Awl	-	-	1	3	-	-	1	3
Wedge	-	-	3	-	-	-	3	-
Pendant	-	-	1	-	-	-	1	-
Articular end, metapodial/long bone	-	-	2	-	-	1	2	1
Pointed bone fragment	5	1	9	5	-	-	14	6
Blunted end fragment	-	-	1	-	-	-	1	-
Formed shaft fragment	-	-	1	-	1	-	2	-
Edged end	-	-	-	1	-	-	-	1
Flaked long bone fragment	1	1	20	4	-	-	21	5
Other formed bone fragment	4	1	24	3	-	-	28	4
Technologically modified bone	3	6	12	8	3	2	18	16
Other formed bone object	-	-	-	7	-	-	-	7
Utilized bone fragment	-	-	12	-	-	-	12	-
Dentalium	2	-	3	4	-	-	5	4
Olivella	-	-	3	-	-	-	3	-
Ochre	129	10	126	31	19	1	274	42
Indeterminate wood	-	1	-	1	-	-	-	2
Indeterminate bone	1	-	3	-	-	-	4	-
Indterminate ochre	-	-	-	1	-	-	-	1
Total	149	20	226	69	25	4	400	93

The barbed harpoon point is illustrated in Figure 3-16;g. The artifact was recovered from the Housepit 1 floor at 45-OK-250. It is manufactured from antler and shows some distal flaking damage.

Awls are illustrated in Figure 3-16;e and 3-17;c,d. Most are manufactured from long bone splinters. One is pierced at the proximal end (Figure 3-16;e). This, in conjunction with its larger size, suggests it may have served a function other than for piercing hides, possibly as a weaving device. Absent are metapodial awls although metapodial fragments may be found

KEY
Site Number:
Master Number:
Tool Type:
Provenience/Level/Feature:
Zone:

a.
45-OK-4
1062
Technologically modified bone
8S9E/130/FE23
-

b.
45-OK-250
684
Formed fragment
6N32W/100/FE8
-

c.
45-OK-250
694
Utilized bone
6N32W/140/FE7
13

f.
45-OK-4
517
Pointed bone fragment
13S16N/140/FE30
2

d.
45-OK-250
761
Formed fragment
5N31W/170/FE7
13

e.
45-OK-250
694
Formed fragment
5N31W/170/FE7
13

g.
45-OK-4
447
Other formed object
8S24W/160/FE31
32

j.
45-OK-4
373
Pointed bone fragment
28S89W/100
41

k.
45-OK-250
1459
Pointed bone fragment
7S27W/120/FE115
12

l.
45-OK-250
467
Pointed bone fragment
9N26W/70
11

m.
45-OK-250
729
Blunt end shaft
6N31W/180/FE7
13

n.
45-OK-250
1840
Pointed bone fragment
10S29W/140/FE95
13

h.
45-OK-250
381
Pointed bone fragment
20S51W/110/FE25
23

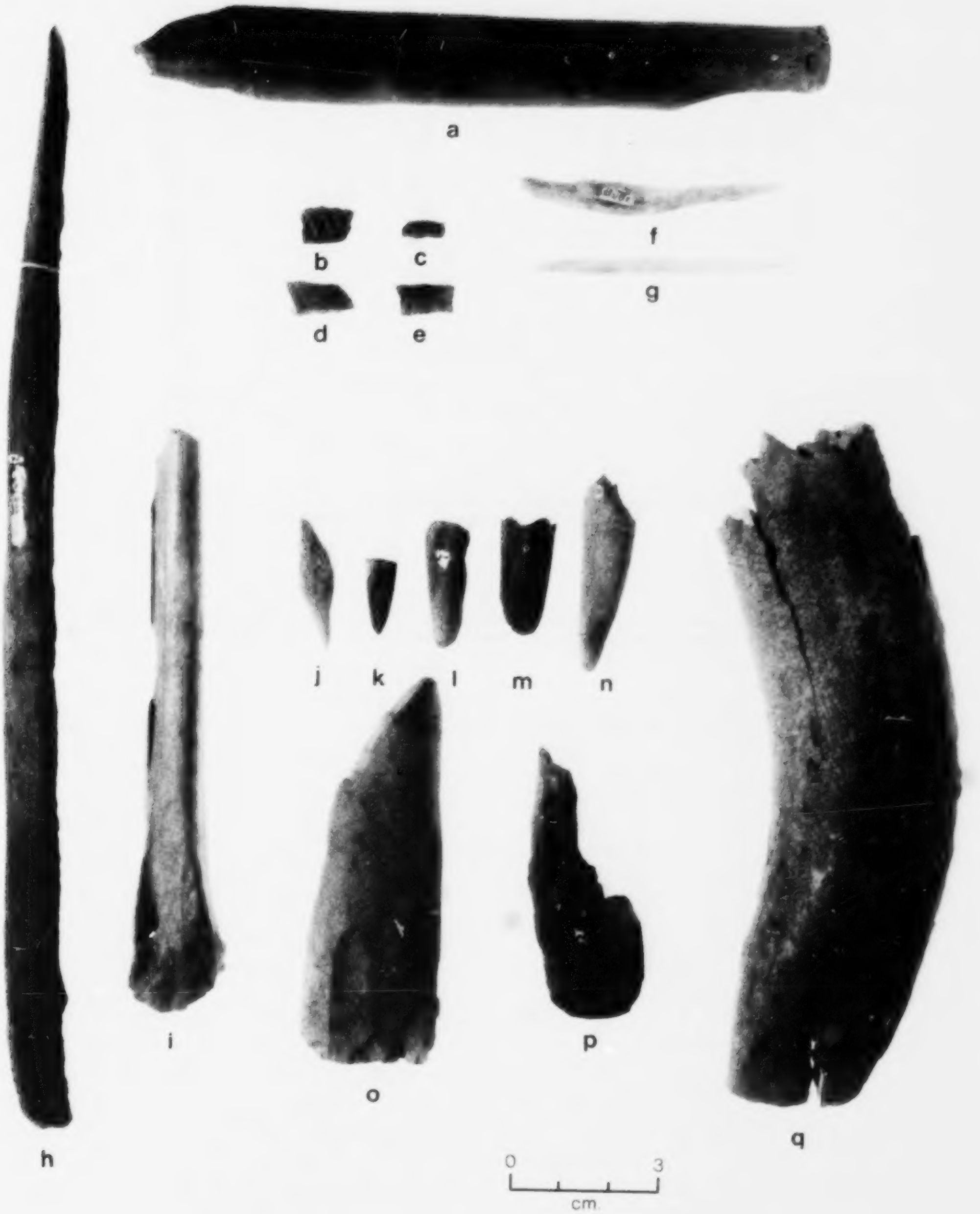
i.
45-OK-4
432
Technologically modified bone
4S35E/200/FE19
32

o.
45-OK-250
900
Technologically modified bone
2N34W/170/FE7
13

p.
45-OK-250
1586
Wedge
8S28W/140/FE11
13

q.
45-OK-250
1082
Wedge
0N26W/105/FE73
14

Plate 3-7. Bone and antler artifacts, 45-OK-250 and 45-OK-4.

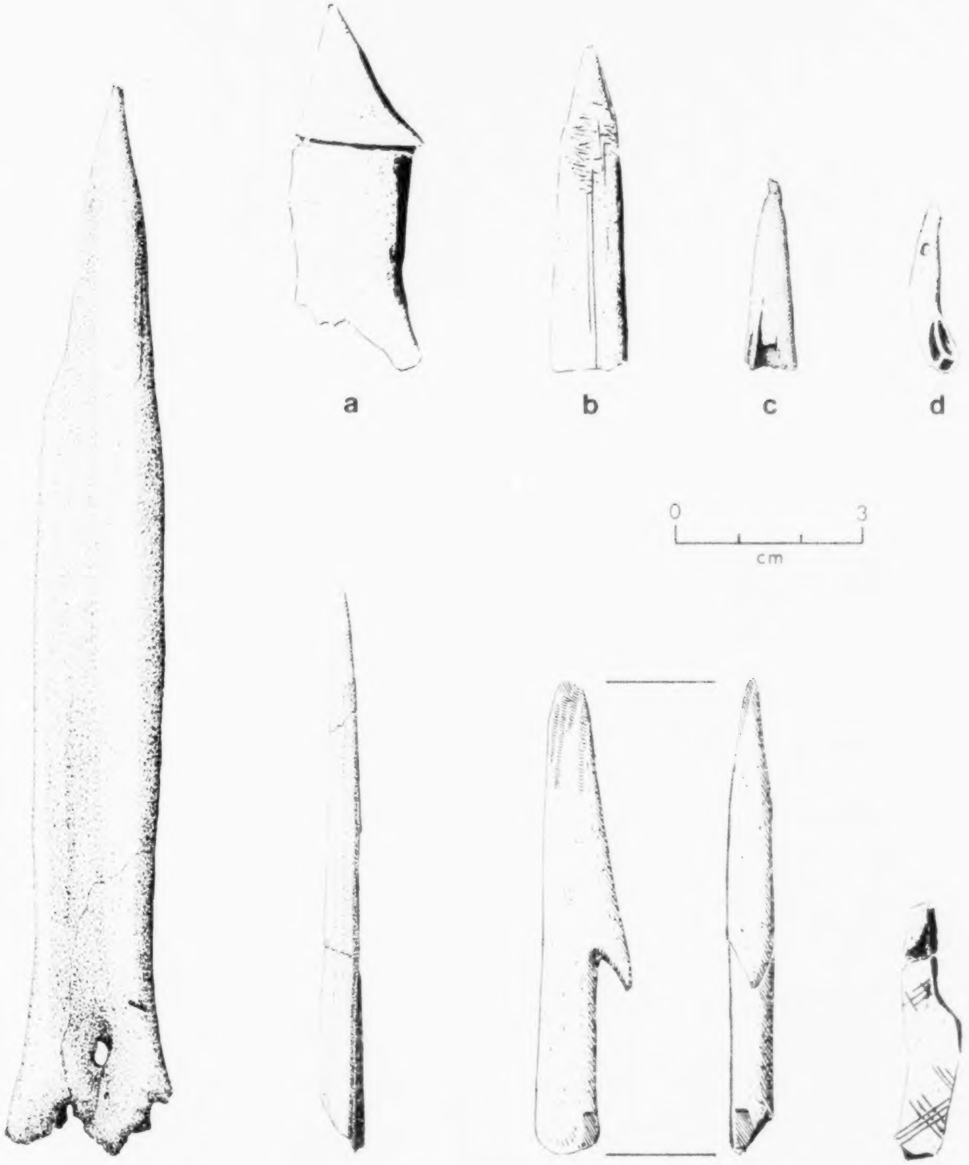

a
b
c
f
d
e
g
j
k
l
m
n
i
o
p
q
h
0
3
cm.

KEY
Master Number:
Tool Type:
Provenience/Level/Feature
Zone:

a.	b.	c.	d.
660	273	783	993
Technologically modified bone	Pointed bone fragment	-	Pendant
2N36W/90	8N38W/90/FE54	2N22W/90/FE30	1N30W/155/FE17
13	22	1	13

e.	f.	g.	h.
391	714	934	1274
Awl	Pointed bone fragment	Barbed harpoon point	Formed bone fragment
12N30W/160/FE12	6N31W/160/FE7	1N34W/160/FE7	2S28W/50
13	13	13	11

Figure 3-16. Bone artifacts, 45-OK-250.


a
b
c
d
0
3
cm
e
f
g
h

KEY

Master Number:
Tool Type:
Provenience/Level/Feature:
Zone:

a.
984
Drilled turtle plaston
(Other formed object)
5S24E/220/F220
32

b.
584
Drilled metapodial fragment
(Other formed object)
6S8E/160/F23
32

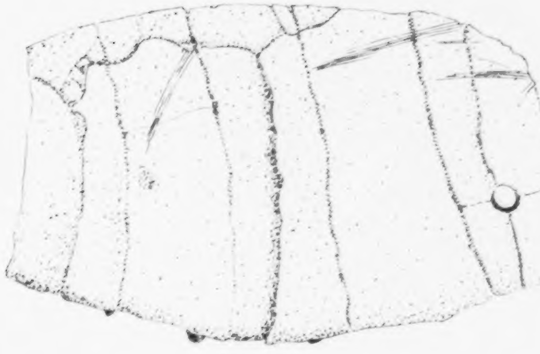
c.
115
Awl
12S18E/140/F29
32

d.
501
Awl
7S21E/190/F31
32

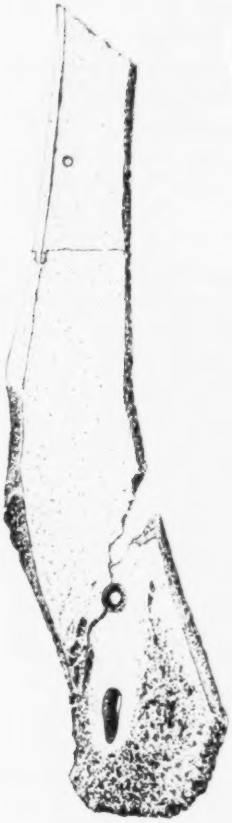
e.
981
Pointed bone fragment
5S24E/190/F33
32

f.
906
Pointed bone fragment
3S8E/80/F11
32

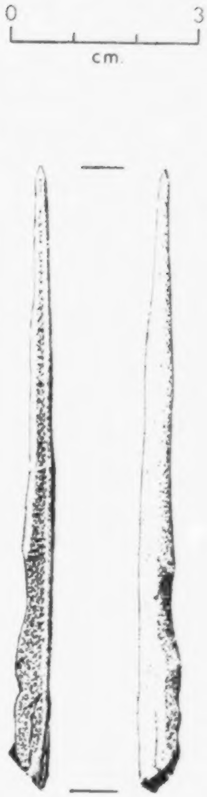
Figure 3-17. Bone artifacts, 45-OK-4.



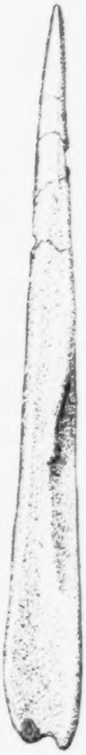
a



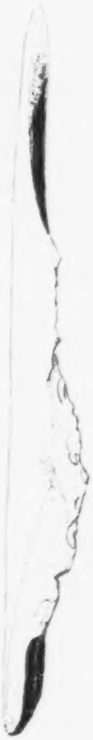
b



c



d



e

f

in the category "articular end." Several of the artifacts classified as "pointed bone fragments" also may be awls (e.g., Figure 3-16;f). Midsections and other fragments occur in other categories as well.

Two of the three wedges are illustrated in Plate 3-7;p,q. All are manufactured from mountain sheep horn and are distinguished by polished, beveled bits. The artifact not illustrated is a small fragment.

The pendant is a pierced deer incisor (Figure 3-16;d). Another artifact which may also have been decorative is a pierced turtle plastron (Figure 3-17;a) classified as an "other formed bone object."

Examples of some of the other categories are also illustrated. The pointed bone fragments include a variety of forms (Plate 3-7;f,h,j,k,l,n; Figure 3-16;d, Figure 3-17;f) ranging from needle-like to large fragments with worn acute tips. Several are antler tine tips and could have served as pressure flaking tools in lithic reduction. The single blunted end bone fragment is distinguished from pointed bone fragments only by its broader width (Plate 3-7;m). The category "other formed bone fragment" includes primarily small pieces of incised bone (Plate 3-7;b through e; Figure 3-16;h). The technologically modified bone includes sawn and end battered specimens as well as other burned and polished fragments (Plate 3-7;a,i,g,o).

Numerous fragments of red hematite and other grey, yellowish and brown soft sedimentary concretions were collected from cultural contexts and have been classified as ocher. They are similar to the shaped, incised siltstone concretions discussed earlier, but lack any modifications.

The fragments of wood are too small for any further determination.

A final note of interest is the observation of short, parallel striae on some modified bone fragments and formed objects, similar to striae observed on a steatite pendant and other steatite pieces at 45-OK-2 (Campbell 1984b). The striae have been experimentally reproduced on bone and steatite using horse tail fern as an abrader. A bone awl from 45-OK-4, 8S24E/160, Feature 31 had these traces. Feature 31 is a floor associated with the Housepit 2 depression which precedes an occupation radiocarbon dated to 2097±132 B.P. Abrasive shaping with horsetail was practiced by Native Americans in the area (Turner et al. 1980:15-17) but not, to our knowledge, recognized in archaeological materials prior to this.

STYLISTIC ANALYSIS

The purpose of the stylistic analysis of projectile points is to identify morphological characteristics which are sensitive to temporal and spatial cultural variation. By correlating sensitive stylistic types with radiocarbon dates, we can develop a local chronology and sequence of occupation which can be compared with sequences developed in other regions of the Plateau. We rely on these stylistic markers for relative age estimates of several of the zones and correlation between the sites.

We have developed a two stage analysis for projectile points. The first stage involves the identification of morphological types within the project area alone. These types have then been ordered into a temporal sequence on the basis of their occurrence in dated contexts at project sites. The second stage involves the statistical redefinition of the morphological types in terms of established Plateau historical forms, allowing us to correlate our results with those of other Plateau archaeological studies and to focus on trends that may represent cultural differences.

This system of analysis has evolved over the past two years as data from individual site analysis has become available. The entire process, system and project-wide results are reported and evaluated in the summary report (Lohse, 1984g).

Eleven dimensions of analysis were established for the identification of morphological types (Appendix B, Table B-20). Intersection of the first four dimensions, blade-stem juncture, outline, stem-edge orientation and size, defines 18 separate types (Figure 3-18). We do not follow through with the intersection of the remaining seven variables here because it generates so many types that variation rather than uniformity is emphasized. The complete morphological classification is presented in Appendix B, Table B-21.

Seventeen of the 18 morphological projectile point types identified in the project area occur in the collection from 45-OK-250 (Table 3-28, Plate 3-8). Estimated zone ages are provided by the chronological distribution presented in Figure 3-19 and by the radiocarbon dates. The ages of the projectile points from Zones 13, 15, and 23 correspond well with the radiocarbon dates. In the other zones, we rely on a small number of points and stratigraphic position for chronological boundaries.

Zones 15 and 24 represent the same depositional unit. The three projectile points from these zones (Types 8 and 11, Plate 3-8;pp through rr) appear at an age compatible with the single radiocarbon date from the top of DU II. Zones 14 and 23 always represented a distinct cultural peak and stratum overlain by at least two other peaks and strata. Three of the points from these zones (Types 18 and 16, Plate 3-8;aa,bb,hh) are not compatible with the estimated ages. We prefer, however, to rely on the consistent stratigraphic position of the zones, the other ten projectile points, and the historical analysis rather than rely on three points for chronological judgement. Projectile points from Zone 22 are similar to those from Zone 13. Most are styles that no longer appear after 1500 B.P. Zone 12 is the most difficult to date. The Type 18 point appears at about 1500 B.P. while Types 6, 7, 8, 11 and 12 disappear at about the same time, providing us some approximation of an upper age limit. This occupation was easily distinguished above the Housepit 1 fill and the southern dump area. It was less easily distinguished in the intervening trench areas. Zone 11 relies on the appearance of the Type 4 points for Types 13, 14, 17, and 18 to the protohistoric for a more recent age estimate. The Type 4 points were recovered from a single test unit and without them we would have little to suggest more recent occupation.

The distribution of morphological types for 45-OK-4 is presented in Table 3-29 and examples illustrated in Plate 3-9. Comparison to the chronological distribution of Table 3-22 shows compatibility with the radiocarbon dates. The protohistoric termination for Zone 31 is presented because of the radiocarbon date. The majority of the points in the zone (Types 8, 5, 6, 7, 11 and 12) no longer appear after 1500 B.P. Only the Type 16 point affirms

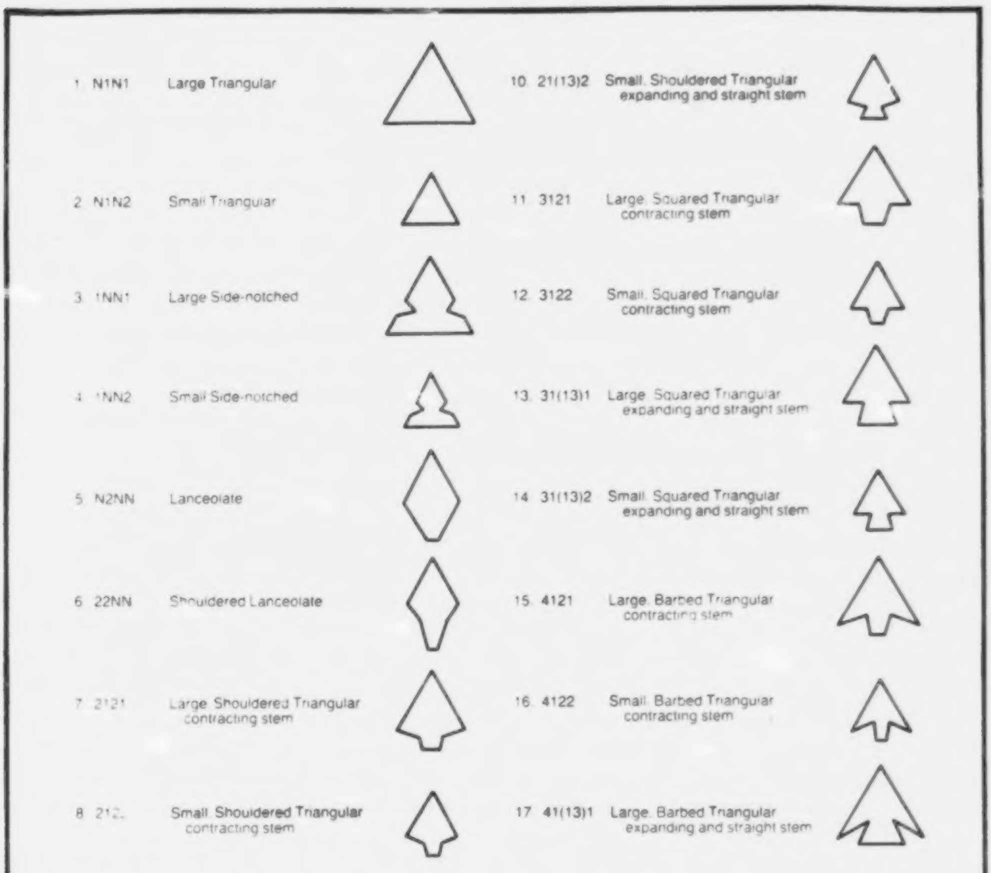

1. N1N1 Large Triangular
2. N1N2 Small Triangular
3. 1NN1 Large Side-notched
4. 1NN2 Small Side-notched
5. N2NN Lanceolate
6. 22NN Shouldered Lanceolate
7. 2121 Large Shouldered Triangular contracting stem
8. 2122 Small Shouldered Triangular contracting stem
9. 21(13)1 Large. Shouldered Triangular expanding and straight stem
10. 21(13)2 Small. Shouldered Triangular expanding and straight stem
11. 3121 Large. Squared Triangular contracting stem
12. 3122 Small. Squared Triangular contracting stem
13. 31(13)1 Large. Squared Triangular expanding and straight stem
14. 31(13)2 Small. Squared Triangular expanding and straight stem
15. 4121 Large. Barbed Triangular contracting stem
16. 4122 Small. Barbed Triangular contracting stem
17. 41(13)1 Large. Barbed Triangular expanding and straight stem
18. 41(13)2 Small. Barbed Triangular expanding and straight stem

Figure 3-18. Morpnological projectile point types.

Table 3-28. Morphological projectile point types by zone, 45-OK-250.

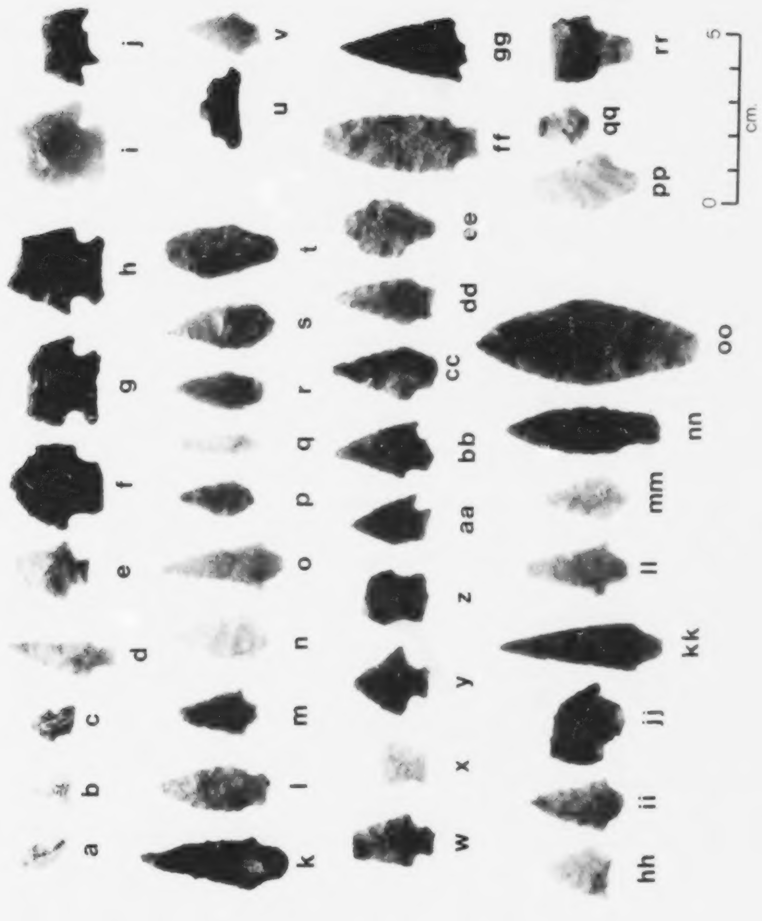
Zone	Radiocarbon Dates	Estimated Age (B.P.)	Morphological Type[1]																	Total
			5	6	3	10	7	8	9	11	12	13	18	15	16	14	17	4	2	
11	–	1000	1	–	–	–	4	2	1	1	2	1	–	–	–	1	1	3	1	18
12	–	1500	2	2	–	–	4	5	–	2	2	2	1	–	–	–	–	–	–	20
13	2989 ± 78 3143 ± 85 3168 ± 76 3194 ± 153 3210 ± 105 3323 ± 105 3453 ± 97	2800	–	1	–	1	7	9	1	2	11	1	–	–	–	–	–	–	–	33
14	–	3500	–	–	–	–	1	3	–	1	1	–	1	–	1	–	–	–	–	8
15	4448 ± 123	3800	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	2
Subtotal			3	3	–	1	16	20	2	7	16	4	2	–	1	1	1	4	1	81
21	–	1000	–	–	–	–	–	–	–	–	–	1	–	1	–	–	1	–	–	3
22	–	2800	1	–	1	–	1	1	1	2	1	1	–	1	–	1	–	–	–	11
23	3349 ± 89	3250	–	–	–	–	2	–	–	1	–	–	1	–	–	1	–	–	–	5
24	–	3800	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1
Subtotal			1	–	1	–	3	1	1	4	1	2	1	2	–	2	1	–	–	20
Total			4	3	1	1	19	21	3	11	17	6	3	2	1	3	2	–	1	101

[1] For age range of point types see Figure 3-19.

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level/Feature:
Zone:
Material:

	Master Number	Morphological Type	Historical Type	Provenience/Level/Feature	Zone	Material
a.	95	4	Plateau side-notched	Test pit 3/40B	-	CCS
b.	92	4	Plateau side-notched	Test pit 3/40B	-	CCS
c.	100	4	Plateau side-notched	Test Pit 3/50B	-	CCS
d.	903	14	Columbia corner-notched A	2N33W/30	11	Jasper
e.	460	13	Columbia corner-notched A	10N26W/30/F29	12	Jasper
f.	518	13	Quilomene Bar corner-notched	16N28W/70	12	Jasper
g.	205	13	Quilomene Bar corner-notched	5N12E/50	21	Jasper
h.	1007	13	Quilomene Bar corner-notched	2N28W/50	11	Jasper
i.	158	17	Qilomene Bar corner-notched	4N12E/40	21	Chalcedony
j.	1178	17	Quilomene Bar basal-notched	2N13W/40	11	Jasper
k.	921	7	Nespelem Bar	1N34W/70	12	Basalt
l.	794	9	Nespelem Bar	1N22W/40/F80	11	Jasper
m.	1472	12	Rabbit Island A	8S26E/30	11	Fine-grained basalt
n.	1329	7	Rabbit Island A	4S27E/60	12	Opal
o.	1242	11	Rabbit Island B	1S29W/80	12	Chalcedony
p.	868	8	Rabbit Island B	1N31W/50	11	Jasper
q.	1779	8	Rabbit Island B	8S30W/120/F95	13	Opal
r.	780	5	Cascade A	5N31W/80	12	Chalcedony
s.	1404	5	Cascade A	6S27W/50/F114	11	Jasper
t.	1201	6	Shouldered lanceolate	1N23W/60	12	Jasper
u.	319	3	Cold Springs side-notched	12S35W/110/F87	22	Jasper
v.	1026	12	Columbia corner-notched B	1N27W/120/F6	13	Jasper
w.	151	13	Columbia Corner-notched A	2N2E/80	22	Jasper
x.	189	14	Columbia corner-notched A	5N32E/90	22	Jasper
y.	330	14	Columbia corner-notched A	13S38W/130/F87	23	Jasper
z.	458	9	Columbia corner-notched A	10N26W/50	13	Fine-grained basalt
aa.	342	16	Columbia corner-notched A	13S35W/150/F87	23	Jasper
bb.	529	18	Columbia corner-notched A	15N28W/130/F13	14	Jasper
cc.	338	7	Nespelem Bar	13S35W/80	22	Jasper
dd.	782	10	Nespelem Bar	2N22W/80/F30	13	Jasper
ee.	327	7	Nespelem Bar	12S35W/170/F87	23	Jasper
ff.	927	7	Nespelem Bar	1N34W/130/F73	14	Opal
gg.	347	15	Rabbit Island A	20S52W/80/F18	22	Jasper
hh.	125	16	Rabbit Island A	1S30W/120/F73	14	Opal
ii.	1532	12	Rabbit Island A	9S26W/160/F95	13	Jasper
jj.	328	11	Rabbit Island A	12S35W/190/F87	23	Jasper
kk.	1557	7	Rabbit Island B	9S25W/170/F95	13	Argillite
ll.	431	11	Rabbit Island B	7S35W/90	22	Jasper
mm.	1065	8	Rabbit Island B	0N28W/105/F73	14	Opal
nn.	1048	6	Shouldered lanceolate	2N25W/130/F7	13	Basalt
oo.	450	5	Cascade A	11S40W/120/F20	22	Jasper
pp.	1283	11	Nespelem Bar	2S28W/140/F15	15	Jasper
qq.	1022	8	Rabbit Island B	1N28W/130/F15	15	Opal
rr.	337	11	Rabbit Island A	13S26W/220/F105	24	Chalcedony

Plate 3-8. Projectile points, 45-OK-250.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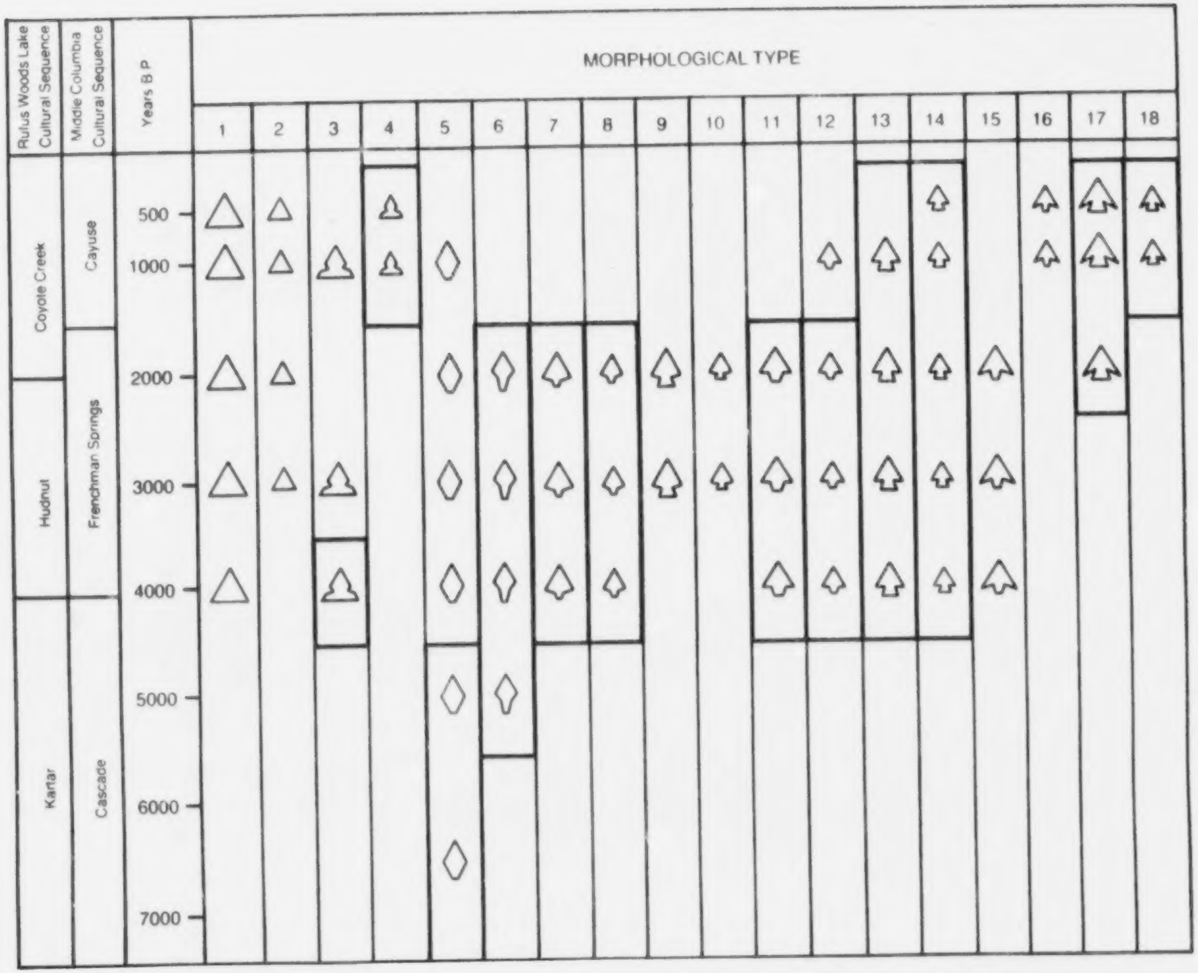


Figure 3-19. Temporal distribution of morphological types in project area.

Table 3-29. Morphological projectile point types by zone, 45-OK-4.

Zone	Radiocarbon Dates	Estimated Age (B.P.)	Morphological Type[1]													
			8	5	6	7	10	11	17	13	14	18	16	1	2	Total
31	670 ± 63	Protohistoric	6	2	2	7	–	4	3	5	1	1	1	–	–	32
32	2097 ± 132 2438 ± 145 2825 ± 86 2845 ± 121 3180 ± 50 3085 ± 110	2000 3200	8	1	3	6	1	7	12	1	2	1	–	–	–	42
33	–	<3200	2	–	–	–	–	–	–	–	–	–	–	–	–	2
41	–	Protohistoric	1	–	1	1	–	1	–	1	–	–	1	1	1	8
42	2895 ± 94 2360 ± 134	2000	1	–	1	–	–	–	2	3	–	–	–	–	–	7
43	3630 ± 113	3500	1	1	1	–	–	–	1	–	1	–	–	1	–	6
Total			19	4	8	14	1	12	18	10	4	2	2	2	1	97

---

[1] For age ranges of point types see Figure 3-19.

KEY:
Master Number:
Morphological Type:
Historical Type:
Provenance/Level/Feature:
Zone:
Material:

a.
926
16
Columbia stemmed A
14S13E/20
31
Opal

b.
204
18
Columbia
corner-notched B
6S41E/30
31
Fine-grained basalt

c.
771
14
Columbia
corner-notcheded B
10S4E/30
31
Jasper

d.
503
13
Columbia
corner-notched B
13S16E/20
31
Jasper

e.
937
13
Columbia
corner-notched A
4N19E/40
31
Opal

f.
502
13
Columbia
corner-notched A
13S16E/10
31
Jasper

g.
668
17
Quilomene Bar
corner-notched
6S28W/40
41
Jasper

h.
222
13
Quilomene Bar
corner-notched
1S30E/20
31
—

i.
773
13
Quilomene Bar
corner-notched
10S4E/50
31
Jasper

j.
742
17
Nespelem Bar
12S35W/50
41
Silicized mudstone

k.
118
7
Nespelem Bar
12S19E/70
31
Opal

l.
119
8
Nespelem Bar
13S18E/20
31
Opal

m.
208
7
Rabbit Island A
6S41E/70
31
Jasper

n.
406
11
Rabbit Island A
16S26W/70
41
Opal

o.
801
11
Rabbit Island B
10S7E/30
31
Fine-grained basalt

p.
235
11
Rabbit Island B
16S12E/30
31
Opal

q.
553
12
Rabbit Island B
14S15E/30
31
Jasper

r.
912
12
Rabbit Island B
9S10E/40
31
Fine-grained basalt

s.
1023
5
Cascade B
5N30E/40
31
Fine-grained basalt

t.
719
8
Shouldered lanceolate
3S42E/40
41
Fine-grained basalt

u.
497
6
Shouldered lanceolate
7S21E/80
31
Jasper

v.
224
6
Shouldered lanceolate
stemmed
31
Jasper

w.
816
8
Wallula Rectangular-
stemmed
10S7E/100/F23
32
Opal

x.
716
13
Columbia
corner-notched A
29S88W/120
42
Jasper

y.
384
13
Columbia
corner-notched A
17S81W/100
42
Jasper

z.
962
11
Nespelem Bar
8S23E/140
32
Jasper

aa.
759
8
Nespelem Bar
9S4E/90/F13
32
Opal

bb.
1030
7
Nespelem Bar
5N38E/80
32
Chalcedony

cc.
649
13
Nespelem Be
15S80W/70/F8
42
Chalcedony

dd.
673
12
Rabbit Island A
6S28W/90
42
Opal

ee.
453
13
Rabbit Island A
8S25E/150/F31
32
Jasper

ff.
787
12
Rabbit Island A
10S6E/50
32
Opal

gg.
805
7
Rabbit Island A
7S10E/110/F24
32
Jasper

hh.
449
7
Rabbit Island B
8S25E/110
32
Jasper

ii.
330
12
Rabbit Island B
18S12E/80
32
Chalcedony

jj.
347
14
Rabbit Island B
19S12E/70
32
Opal

kk.
173
12
Rabbit Island B
11S10E/130/F23
32
Jasper

ll.
889
5
Cascade C
9S9F/60
32
Jasper

mm.
727
6
Cascade C
7S37E/100
42
Fine-grained basalt

nn.
101
6
Shouldered lanceolate
8S18E/140
32
Jasper

oo.
548
6
Shouldered lanceolate
14S14E/100/F29
32
Jasper

pp.
704
14
Columbia
corner-notched B
34S83W/60
43
Opal

qq.
320
8
Nespelem Bar
17S13E/150
33
Jasper

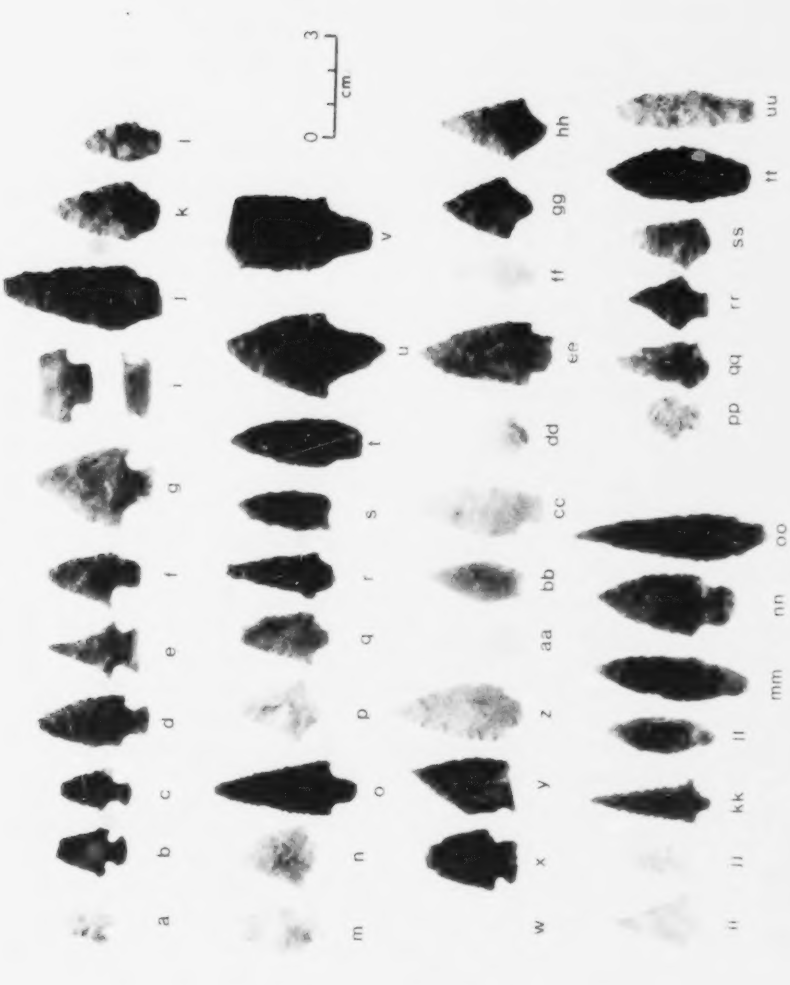
rr.
693
8
Rabbit Island B
13S26W/110
43
Fine-grained basalt

ss.
299
8
Rabbit Island B
17S13E/140
33
Opal

tt.
711
6
Cascade A
35S83W/220
43
Indeterminate

uu.
402
5
Cascade B
15S26W/170
43
Opal

Plate 3-9. Projectile points, 45-OK-4.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tt
uu

11 and 12) no longer appear after 1500 B.P. Only the Type 16 point affirms occupation in the last 1,000 years.

HISTORICAL PROJECTILE POINT CLASSIFICATION

In the second stage of the analysis, the projectile points were assigned to recognized historic types by discriminant analysis. Metric definitions of the 23 historical types were derived from digitized measurements of a type collection of over 1200 specimens, from well-dated contexts at sites from the Fraser River to the Snake and from the Dalles to the Libby Reservoir in Montana (Appendix B, Figure B-21). Many of the locations are type sites for the projectile point definitions.

Tables 3-30 and 3-31 present the relation of historical and morphological types by site. At 45-OK-250 Types 3, 5, 10, 15 and 16 have correspondences with single historical types. The morphological types with larger frequencies are included in several historical types. The morphological Types 7, 8, 9, 11 and 12 all become variants of the Rabbit Island stemmed form as do some or all of Types 9, 10, 13, 15, 16, and 18. In this instance it appears that more distinctions are made by the morphological classification. A similar situation occurs at 45-OK-4.

Historical types are presented by zone for each site in Tables 3-32 and 3-33 and by general zone in Figure 3-20. A small number of historic types including Plateau Side-notched, Columbia Stemmed A, and Quilomene Bar forms distinguish Zone 51 from the older zones. The small side-notched (Plate 3-8;a through c) and stemmed styles (Plate 3-9;a) are found throughout the Plateau characterizing the last 1,000 years (Nelson 1969; Greengo 1982). The Quilomene Bar series (Plate 3-8;f through j; Plate 3-9;g,h,and uu) is thought to appear about 2500 B.P. with similar forms continuing into the last 1,000 years (Nelson 1969). The specimens are all basal fragments of large points with pronounced corner or basal notching. Another artifact from Zone 52 classified as Cold Springs Side-notched (Plate 3-8;u) is very similar to the Quilomene Bar forms, and would be better characterized as such considering the temporal association of Cold Springs Side-notched points with the Cascade or Kartar Phases (Bense 1972; Lohse 1984;g). Notably, most of the Quilomene Bar points are from the upper zones at 45-OK-250.

Columbia Corner-notched B and Wallula Rectangular stemmed points are also generally associated with relatively recent assemblages. The historical classification shows the first style in all zones and the second in Zone 52. The Columbia Corner-notched B artifacts (Plate 3-8;d and v; Plate 3-9;b through d) have barbed shoulders and expanding stems. Leonhardy and Rice (1970) illustrate similar specimens as characteristic of the Harder and Tucannon Phases. Comparable specimens are also illustrated by Nelson (1969) and Greengo (1982). The specimens from Zone 52, 45-OK-250 (Plate 3-8;v) and Zone 53, 45-OK-4 (Plate 3-9;oo) appear more similar to Rabbit Island stemmed forms eliminating some temporal difficulty.

The Wallula Rectangular stemmed style has a narrow triangular blade, straight to slightly barbed shoulders and relatively straight stem (Plate 3-9;v). They are attributed to the more recent Cayuse Phase (Nelson 1969) and

Table 3-30. Historic projectile point type by morphological type, 45-OK-250.

Historical Type	Morphological Type																	
	5	6	3	10	7	8	9	1	12	13	18	15	16	14	17	4	2	Total
Cascade A	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Shouldered Lanceolate	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Cold Springs Side-notched	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Nespelem Bar	–	–	–	1	13	6	2	3	1	–	–	–	–	–	–	–	–	26
Rabbit Island A	–	–	–	–	3	1	–	5	8	1	1	2	1	–	–	–	–	22
Rabbit Island B	–	–	–	–	3	14	–	3	7	–	–	–	–	–	–	–	–	27
Columbia Corner-notched A	–	–	–	–	–	–	1	–	–	2	2	–	–	2	–	–	–	7
Quilomene Bar Basal-notched	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
Quilomene Bar Basal-notched B	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
Quilomene Bar Corner-notched	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	3
Columbia Corner-notched B	–	–	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	2
Plateau Side-notched	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	3
Not Assigned	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	2
Total	4	3	1	1	19	21	3	11	17	6	3	2	1	3	2	3	1	101

Table 3-31. Historic projectile point type by morphological type, 45-OK-4.

Historical Type	Morphological Type														
	6	5	7	8	10	11	12	13	14	18	17	16	11	2	N/A	Total
Cascade A	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Cascade B	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Cascade C	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2
Shouldered Lanceolate	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6
Nespelem Bar	–	1	9	10	1	3	2	1	1	–	–	–	–	–	1	29
Rabbit Island A	–	–	3	1	–	5	5	2	–	1	–	–	–	–	–	17
Rabbit Island B	–	–	1	6	–	4	11	–	1	–	–	–	–	–	–	23
Columbia Corner-notched A	–	–	–	–	–	–	–	4	–	–	–	–	–	–	–	4
Quilomene Bar Corner-notched	–	–	–	–	–	–	–	2	–	–	1	–	–	–	–	3
Wallula Rectangular Stemmed	–	–	–	2	–	–	–	1	–	–	–	–	–	–	1	4
Columbia Corner-notched B	–	–	–	–	–	–	–	–	2	1	1	–	–	–	–	3
Columbia Stemmed A	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
Not Assigned	–	–	1	–	–	–	–	–	–	–	–	–	2	1	1	5
Total	8	4	14	19	1	12	18	10	4	2	1	1	2	1	3	100

Table 3-32. Historic projectile point types by zone, 45-OK-250.

Historical Type		Zone									
		11	12	13	14	15	21	22	23	24	Total
Cascade A	N	1	2	-	-	-	-	1	-	-	4
	%	5.6	10.0					9.1			
Shouldered Lanceolate	N	-	1	1	-	-	-	-	-	-	2
	%		5.0	3.0							
Cold Springs Side-notched	N	-	-	-	-	-	-	1	-	-	1
	%							9.1			
Plateau Side-notched	N	3	-	-	-	-	-	-	-	-	3
	%	16.7									
Nespelem Bar	N	5	5	7	3	1	-	2	2	1	26
	%	27.8	25.0	21.2	37.5	50.0		18.2	40.0	100.0	
Rabbit Island A	N	4	4	8	1	-	1	3	1	-	22
	%	22.2	20.0	24.2	12.5		33.3	27.3	20.0		
Rabbit Island B	N	1	5	15	3	1	-	2	-	-	27
	%	5.6	25.0	45.5	37.5	50.0		18.2			
Columbia Corner-notched A	N	-	1	1	1	-	-	2	2	-	7
	%		5.0	3.0	12.5			18.2	40.0		
Quilomene Corner-notched	N	1	1	-	-	-	1	-	-	-	3
	%	5.6	5.0				33.3				
Columbia Corner-notched B	N	1	-	1	-	-	-	-	-	-	2
	%	5.6		3.0							
Quilomene Bar Basal-notched	N	1	-	-	-	-	-	-	-	-	1
	%	5.6									
Quilomene Bar Basal-notched B	N	-	-	-	-	-	1	-	-	-	1
	%						33.3				
Not Assigned	N	1	1	-	-	-	-	-	-	-	2
Total	N	18	20	33	8	2	3	11	5	1	101

Table 3-33. Historic projectile point types by zone, 45-OK-4.

Historical Type		Zone						
		31	32	33	41	42	43	Total
Cascade A	N	-	-	-	-	-	1	1
	%						16.7	
Cascade B	N	1	-	-	-	-	1	2
	%	3.1					16.7	
Cascade C	N	-	1	-	-	1	-	2
	%		2.3			14.3		
Shouldered Lanceolate	N	2	3	-	1	-	-	6
	%	6.3	6.8		11.1			
Nespelem Bar	N	11	13	1	3	1	-	29
	%	34.4	29.5	50.0	33.3	14.3		
Rabbit Island A	N	3	10	-	2	2	-	17
	%	9.4	22.7		22.2	28.6		
Rabbit Island B	N	6	14	1	-	-	2	23
	%	18.8	31.8	50.0			33.3	
Columbia Corner-notched A	N	2	-	-	-	2	-	4
	%	6.3				28.6		
Quilomene Bar Corner-notched	N	2	-	-	1	-	-	3
	%	6.3			11.1			
Columbia Corner-notched B	N	3	-	-	-	-	1	4
	%	9.4					16.7	
Wallula Rectangular Stemmed	N	-	2	-	-	1	-	3
	%		4.5			14.3		
Columbia Stemmed A	N	1	-	-	-	-	-	1
	%	3.1						
Not Assigned	N	1	1	-	2	-	1	5
	%	3.1	2.3		22.2		16.7	
Total	N	32	44	2	9	7	6	100

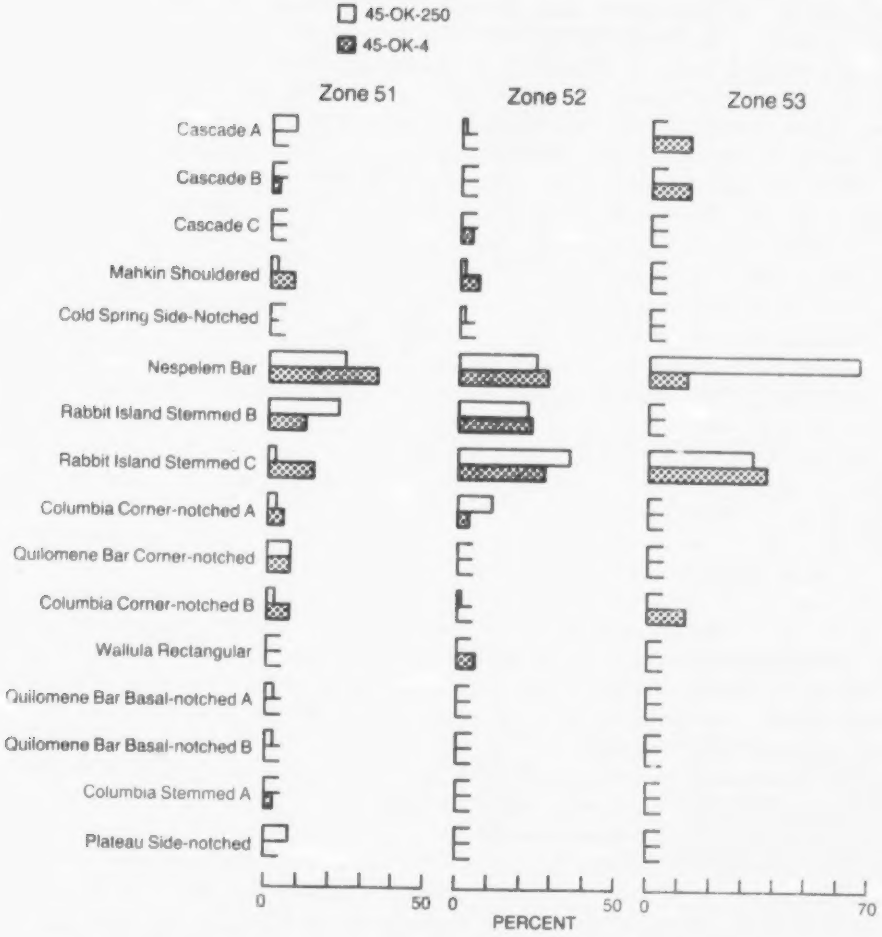


Figure 3-20. Distribution of historical types by zone, 45-OK-250 and 45-OK-4.

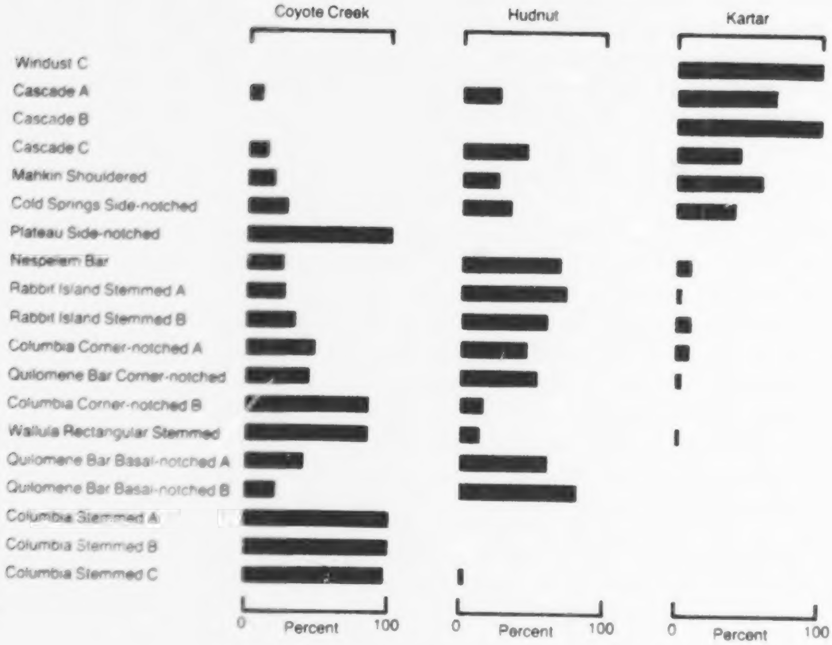
seem out of place in Zone 52. However, this type and the Columbia Corner-nothced B occasionally are found in Hudnut Phase associations (Figure 3-21).

Columbia Corner-notched A points appear in Zone 51 and more frequently in Zone 52 (Plate 3-8;e,w through bb; Plate 3-9;e,f,w,x). These points have straight to expanding stems, often slightly irregular outlines, variable flaking patterns and bi-convex cross section. They mark the Tucannon Phase on the Lower Snake and continue to appear well into the Harder Phase. Similar forms are also found on the Middle Columbia (Nelson 1969; Greengo 1982).

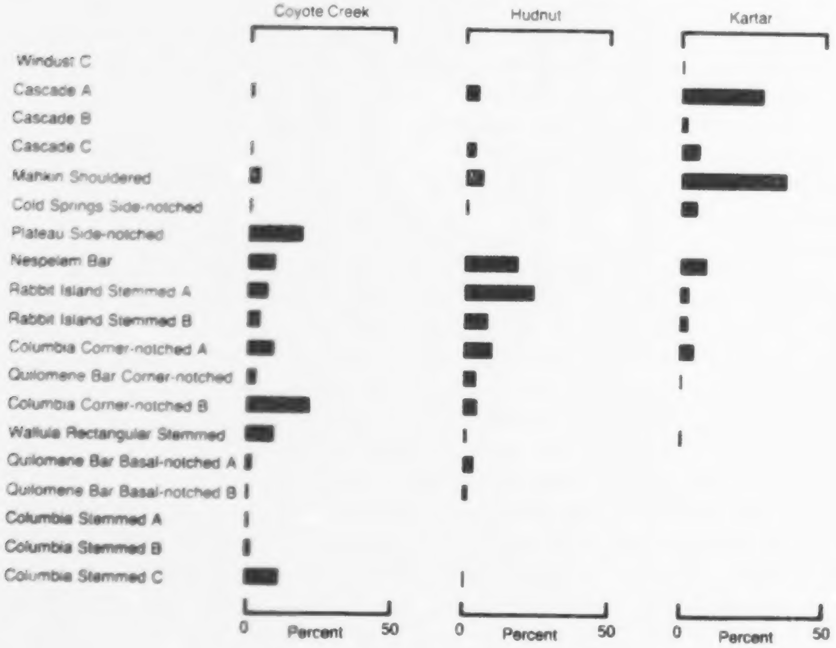
Older forms including shouldered lanceolate and Cascade points, are found in all zones. The Cascade A points (Plate 3-8;r,s,oo; Plate 3-9;ss) from both sites are planoconvex or biconvex in cross section with variable flaking patterns. They are broad and made on flakes. The Cascade B points (Plate 3-9;r,tt) have non-tapering bases and incomplete, poorly controlled flaking. Cross sections are biconvex and trapezoidal. Classification is based on similarity to specimens illustrated by Rice (1972) and Leonhardy (1970). The Cascade C points (Plate 3-9;kk,ll) are bi-pointed with a diamond shaped outline, biconvex cross section, and variable flaking pattern. They resemble the classic Cascade type (Butler 1962; Rice 1965; Rice 1969, 1972; Leonhardy 1970; Leonhardy and Rice 1970). The shouldered lanceolate forms range from specimens with weakly developed shoulders (Plate 3-8; Plate 3-9;s,nn) to large forms with pronounced stems and tanged barbs (Plate 3-9;t,u) to a single nearly side-notched form (Plate 3-9;mm). Flaking is variable and cross section is biconvex on all but one artifact which is diamond shaped. Shouldered lanceolate forms have been found in late Cascade, Tucannon and Frenchman Springs assemblages (Rice 1969, 1972; Leonhardy 1970; Nelson 1969; Greengo 1982). They seem to be more common in early assemblages on the Upper Columbia River than the Middle Columbia or Lower Snake River (Grabert 1968; Nelson 1969; Chance and Chance 1982).

We have little difficulty explaining the presence of older styles as points picked up from beaches or eroded surfaces and re-incorporated into later cultural deposits. Some Kartar Phase deposits are incorporated into Zone 53 at 45-OK-4, as indicated by the Cascade points from Zone 43, the greater proportion of basalt in Zone 33, the few carbonate coated artifacts and stratigraphic information from 9S29E.

The projectile point styles are dominated at both sites, and particularly in Zone 52, by Rabbit Island stemmed forms. The Nespelem Bar form, a Rabbit Island Stemmed variant is a frequent type in the project area, but poorly documented elsewhere on the Plateau. The specimens have slight to well-defined sloping shoulders and contracting, usually rounded stems (Plate 3-8;k,f,cc through ff,pp; Plate 3-9;i through k, y through bb, and pp). The Rabbit Island Stemmed A have squared shoulders with contracting stems and are characteristic of the Frenchman Springs Phase defined by Nelson (1969). They are occasionally found in Tucannon age assemblages with Columbia Corner-notched forms in the Southern Plateau (Leonhardy and Rice 1970). Rabbit Island Stemmed B forms are distinguished by markedly contracting stems. Cross section for all forms is most often biconvex with planoconvex, diamond and trapezoidal cross sections also found. Flaking is variable. Specimens in the A and B groups sometimes have serrated blade edges.



a. Proportion of type across all phases.



b. Proportion of type within phase.

Figure 3-21. Occurence of historic projectile point types in project area by phase.

We find variation in the distribution of the Nespelem Bar and and Rabbit Island Stemmed B points between sites which may be temporally significant. Comparison of the percentages of the two types in Zones 51 and 52 suggests the Nespelem Bar form is more common in the later deposits and Rabbit Island B forms in the earlier. Figure 3-22 presents relative frequencies by the smaller zonal units at each site. The figure clearly illustrates the trend among the better delineated Zones 11 though 13 of 45-OK-250 and in Zones 31 and 32 at 45-OK-4.

Notably, the difference in frequencies is less pronounced in Zone 32 at 45-OK-4 than in Zone 13 at 45-OK-250. Recalling that only portions of the zones are contemporaneous (Figure 2-16), we have isolated projectile points from well dated contexts and contexts with sequential stratigraphic locations at each site. Figure 3-22 also shows the relative frequencies of the two projectile point styles in these finer contxts. In features at 45-OK-250 ranging from about 3000 B.P. to about 3400 B.P the Rabbit Island B is dominant. At 45-OK-4 we recalculated the the frequencies for Zone 32, excluding the projectile points from Housepit 5. Housepit 5 is dated to 3085±114 B.P., representing occupation contemporaneous with Zone 13, 45-OK-250. The relative frequencies of the two styles among the remaining points can be regarded as representing the latter portion of the Hudnut Phase represented by Zone 32. Here, we find the Nespelem Bar points dominant. Figure 3-23 presents the distribution of Rabbit Island Stemmed forms in the Housepit 5 area at 45-OK-4. The projectile points recovered from the floor are Rabbit Island A (N=2) or Rabbit Island B (N=4) and a single Nespelem Bar. In each 1 x 1 m unit in which both styles occur, the Nespelem Bar points are from a higher elevation than the Rabbit Island B. None of the Rabbit Island B points were found above level 60. The zone distribution of the points which is based on stratigraphic distinctions as well as peaks in cultural material reflects the temporal contrast between the styles.

On the basis of evidence from both sites we suggest a significant change in projectile point styles in the later portion of the Hudnut Phase, after about 3000 B.P.

In summary, the projectile point analysis demonstrates the nearly exclusive appearance of Rabbit Island style projectile points associated with well-defined Hudnut Phase components. There is also evidence for temporal variability within the phase in variants of the style. Zone 51, very near the chronological boundary between Hudnut and Coyote Creek Phases, is still dominated by this style but foreshadows the appearance and proliferation of the small stemmed, side-and corner-notched forms characteristic of more recent cultural phases. It also affirms the appearance of Quilomene Bar forms after about 2500 B.P. and shows them to be good temporal markers, but not necessarily definitive of an additional phase on the Upper Columbia as suggested by Galm et al. (1981). Correlation of the zones and Plateau cultural phases is presented in Figure 3-24.

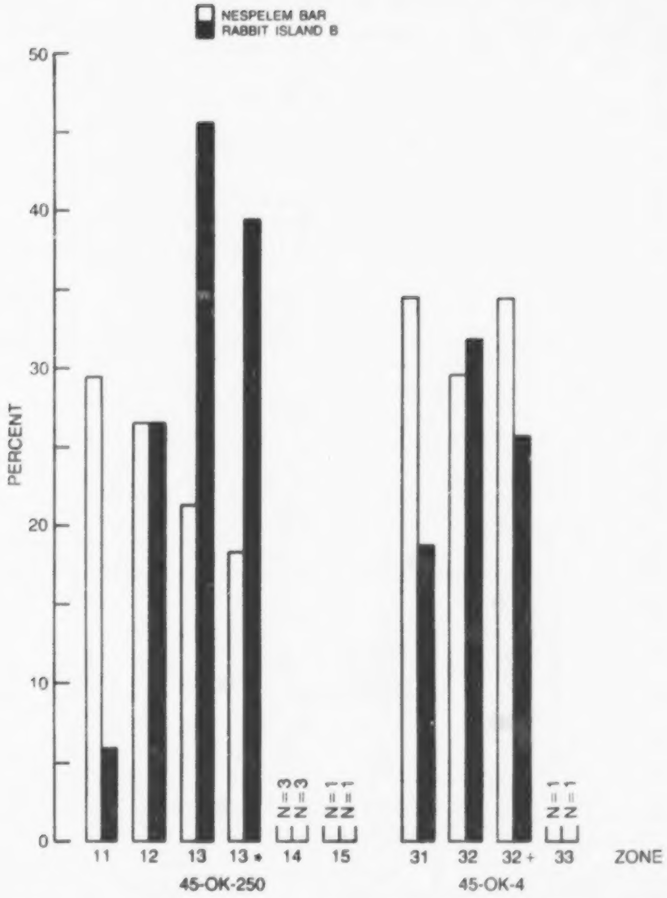


Figure 3-22. Relative frequencies of Nespelem Bar and Rabbit Island B projectile points by zones, 45-OK-250 and 45-OK-4.

*From well-dated contexts within Zone 13: Housepit 1 floor, N=9, 2989±76, 3219±95 B.P., Dump Stratum II, N=16, 3143±85, 3323±105 B.P.

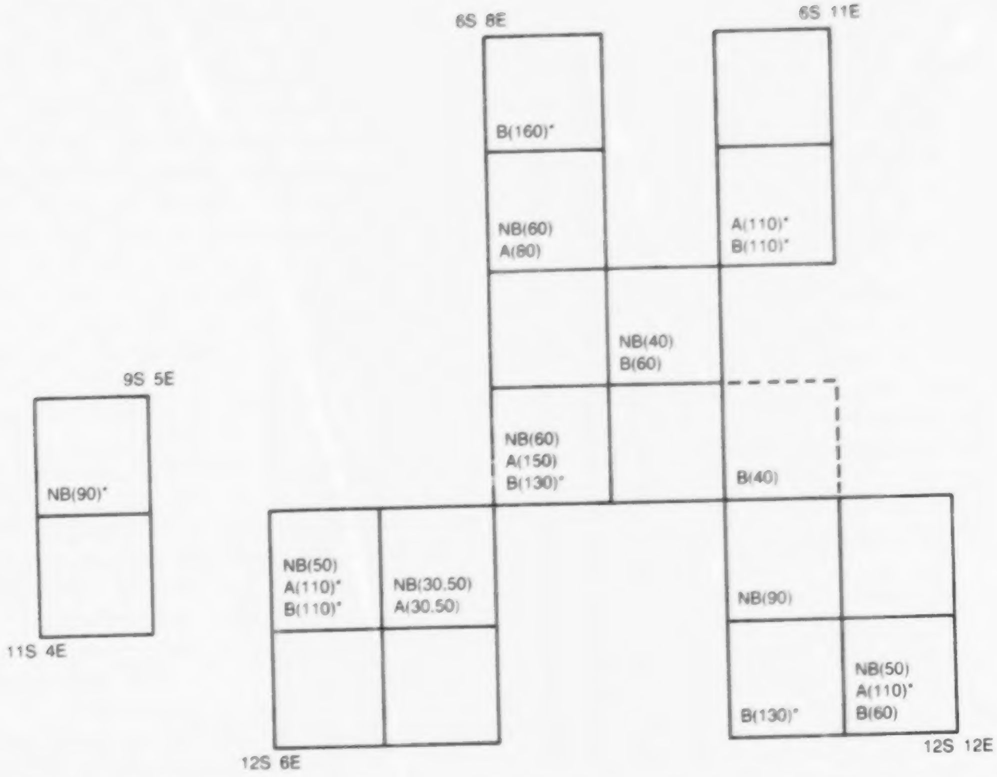

8S 8E
6S 11E
B(160)*
NB(60)
A(80)
A(110)*
B(110)*
NB(40)
B(60)
9S 5E
NB(60)
A(150)
B(130)*
B(40)
NB(90)*
NB(50)
A(110)*
B(110)*
NB(30,50)
A(30,50)
NB(90)
11S 4E
NB(50)
A(110)*
B(60)
B(130)*
12S 6E
12S 12E

Figure 3-23. Distribution of Rabbit Island Stemmed points in Housepit 5 Area, 45-OK-4.

NB=Nespelem Bar
A =Rabbit Island Stemmed A
B =Rabbit Island Stemmed B
* =Recovered from HP 5 floor
(30)=Unit level

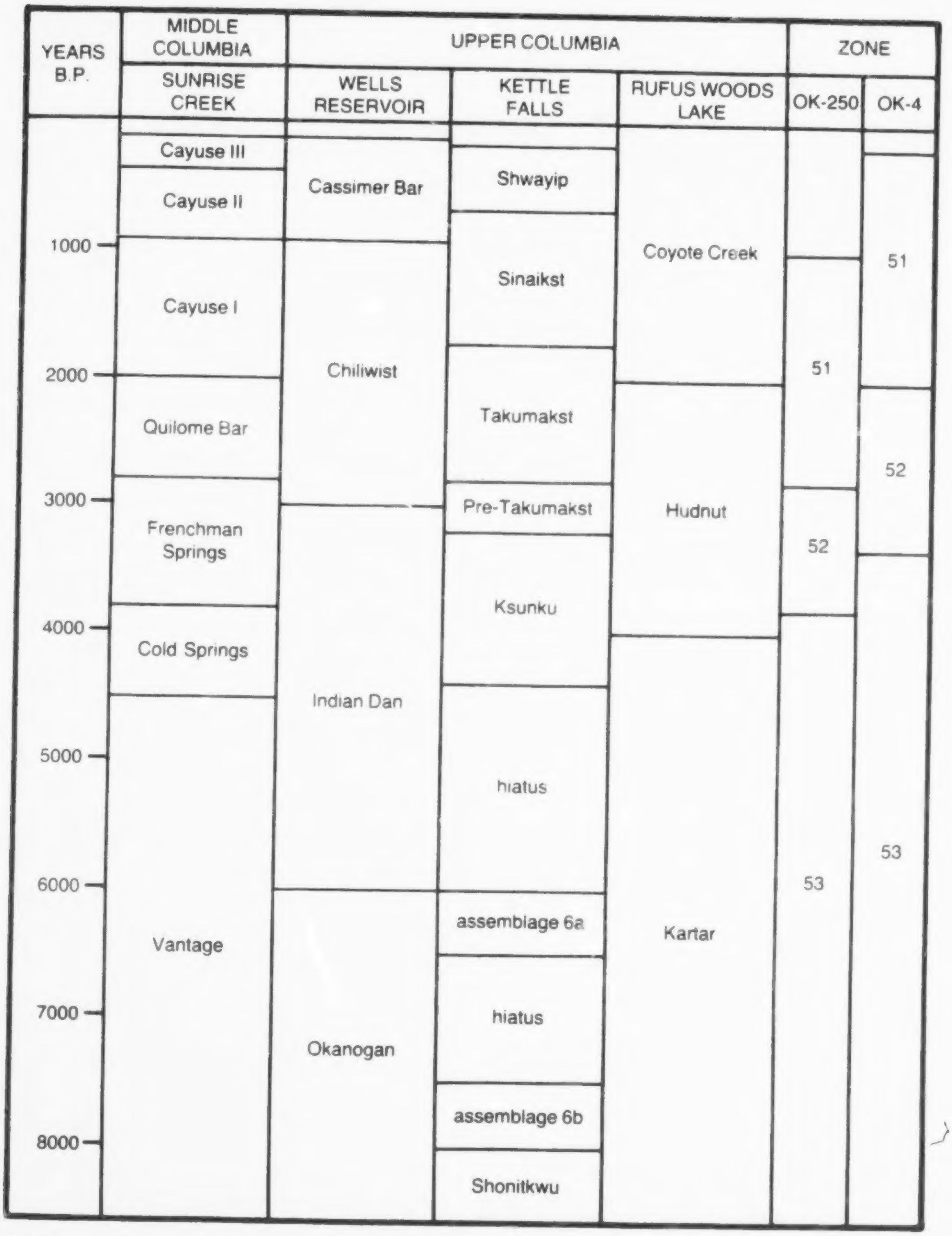

YEARS B.P.
MIDDLE COLUMBIA
UPPER COLUMBIA
ZONE
SUNRISE CREEK
WELLS RESERVOIR
KETTLE FALLS
RUFUS WOODS LAKE
OK-250
OK-4
1000
2000
3000
4000
5000
6000
7000
8000
Cayuse III
Cayuse II
Cayuse I
Quilome Bar
Frenchman Springs
Cold Springs
Vantage
Cassimer Bar
Chiliwist
Indian Dan
Okanogan
Shwayip
Sinaikst
Takumakst
Pre-Takumakst
Ksunku
hiatus
assemblage 6a
hiatus
assemblage 6b
Shonitkwu
Coyote Creek
Hudnut
Kartar
51
52
53
51
52
53

Figure 3-24. Correlation of zones at 45-OK-250 and 45-OK-4 with Plateau cultural chronologies.

4. FAUNAL ANALYSIS

Zoological remains from archaeological sites provide a unique source of data on the ecology and historic biogeography of animal species living in the area, and on utilization of faunal resources by human occupants. This chapter describes the faunal assemblage from 45-OK-250 and 45-OK-4, and summarizes the implications of the assemblage for understanding the archaeology of the site.

FAUNAL ASSEMBLAGE

The distribution of vertebrate and invertebrate materials is shown in Table 2-1. The vertebrate assemblage from 45-OK-250 consists of 258,168 bone fragments weighing 57,412 g. We were able to identify approximately 1% (2,660 elements) to at least the family level. Eighty percent (2,122 elements) are mammalian, 13% (349 elements) are reptilian, less than 1% (1 element) are amphibian, and 7% (188 elements) are fish. The vertebrate assemblage from 45-OK-4 consists of 207,790 bone fragments weighing 47,925 g. Approximately 1.4% (2,969 elements) were identifiable. Seventy-four percent (2,203) elements) are mammalian, 5% (158 elements) are reptilian, and 21% (608 elements) are fish. Composition and distribution of the vertebrate assemblage are shown in Table 4-1. The invertebrate assemblage from 45-OK-250 consists of 81,373 shells (only partial weights were taken) and the assemblage from 45-OK-4 consists of 28,403 shells (weights were not taken). The shells have not been taxonomically identified. Tables C-1 and C-2, Appendix C, provide a tabulation of the assemblage by the finer area-zones.

The following species list describes the assemblage by taxon, giving criteria used to identify elements where appropriate, and comments on known distribution and cultural significance of each taxa. A summary of the elements representing each taxon is provided in Appendix C.

SPECIES LIST

MAMMALS (NISP=2,122 - 45-OK-250; NISP=2,203 - 45-OK-4)

Sorex spp. (shrews) 45-OK-250 -- 1 element.

Five species of shrews are known to occur in the project area: *Sorex obscurus*, *S. vagrans*, *S. cinereus*, *S. trowbridgii*, *S. merriami*. These elements could not be identified to the species level.

Table 4-1. Taxonomic composition and distribution of vertebrate remains, 45-OK-250 and 45-OK-4.

Taxon	45-OK-250								45-OK-4							
	Zone						Site Total		Zone						Site Total	
	S1		S2		S3				S1		S2		S3			
	NISP[1]	MNI[2]	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
MAMMALIA (45-OK-4 NISP=2,203; 45-OK-250 NISP=2,122)																
Soricidae																
Sorex sp.	–	–	1	1	–	–	1	1	–	–	–	–	–	–	–	–
Leporidae	–	–	–	–	–	–	–	–	–	–	1	1	–	–	1	1
Sylvilagus nuttallii	–	–	1	1	–	–	1	1	–	–	–	–	–	–	–	–
Sciuridae																
Marmota flaviventris	1	1	4	1	3	1	8	1	3	1	8	1	1	1	12	2
Spermophilus spp.	–	–	2	1	2	1	4	2			1	1			1	1
Geomyidae																
Thomomys talpoides	15	3	72	11	62	8	149	17	5	1	72	8	44	4	121	12
Heteromyidae																
Perognathus parvus	18	6	46	9	5	3	69	17	12	5	34	14	13	3	59	15
Castoridae																
Castor canadensis	–	–	–	–	–	–	–	–	–	–	1	1	–	–	1	1
Cricetidae	1	–	4	–	3	–	8	–	2	–	2	–	1	–	5	–
Peromyscus maniculatus	3	2	15	4	1	1	19	6	3	2	7	4	–	–	10	6
Microtus spp.	1	1	1	1	2	1	4	2	–	–	6	4	–	–	6	4
Lagurus curtatus	–	–	–	–	–	–	–	–	–	–	1	1	–	–	1	1
Mustelidae																
Mustela frenata	–	–	–	–	–	–	–	–	3	1	–	–	–	–	3	1
Mephitis mephitis	–	–	–	–	–	–	–	–	–	–	2	1	–	–	2	1
Canidae	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–
Canis spp.	3	1	32	1	2	1	37	1	–	–	4	1	1	1	5	1
Cervidae	–	–	8	–	1	–	9	–	–	–	4	–	–	–	4	–
Cervus elaphus	–	–	1	1			1	1	–	–	3	1	1	1	4	1
Odocoileus spp.	147	3	487	8	104	2	738	9	61	1	584	14	58	4	703	13
Antilocapridae																
Antilocapra americana	–	–	–	–	–	–	–	–	–	–	3	1	–	–	3	1
Bovidae																
Ovis canadensis	11	1	4	1	42	2	57	3	10	1	54	3	13	1	77	4
Deer-Sized	206	–	701	–	84	–	990	–	37	–	800	–	37	–	874	–
Elk-Sized	2	–	1	–	–	–	3	–	1	–	2	–	–	–	3	–
REPTILIA (45-OK-4 NISP=158; 45-OK-250 NISP=348)	91	–	192	–	66	–	348	–	9	–	146	–	3	–	158	–
Chelydridae																
Chrysemys picta	86	–	118	–	11	–	215	–	9	–	115	–	3	–	127	–
Colubridae	4	–	72	–	55	–	131	–	–	–	31	–	–	–	31	–
Viperidae																
Crotalus viridis	1	–	2	–	–	–	3	–	–	–	–	–	–	–	–	–
AMPHIBIA (45-OK-250 NISP=1)	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–
Ranidae/Bufonidae	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–
PISCES (45-OK-4 NISP=608; 45-OK-250 NISP=188)	8	–	170	–	10	–	188	–	24	–	554	–	30	–	608	–
Salmonidae	7	–	159	–	10	–	176	–	21	–	532	–	27	–	580	–
Oncorhynchus tshawytscha	–	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–
Cyprinidae	–	–	10	–	–	–	10	–	3	–	21	–	3	–	27	–
Catostomidae	1	–	–	–	–	–	1	–	–	–	1	–	–	–	1	–
TOTAL	517		1,764		379		2,660		209		2,546		206		2,969	

[1] NISP = Number of Identified Specimens.
[2] MNI = Minimum Number of Individuals.

Sylvilagus nuttallii (Nuttall cottontail) 45-OK-250 -- 1 element.

Three species of rabbits may be present in the site area. *Sylvilagus nuttallii* and *S. idahoensis* are both native to eastern Washington, *S. floridanus* was introduced in the early 20th century (Dalquest 1941). Of the two native species *S. nuttallii* is larger and more abundant. This specimen was identified as *S. nuttallii* because of its size. *S. nuttallii* is a common resident of rocky, sagebrush habitats in the project area. Both rabbits and hares were sought by ethnographic tribes for furs and food (Post 1938:24; Ray 1933:87).

Marmota flaviventris (yellow-bellied marmot) 45-OK-250 -- 8 elements, 45-OK-4 -- 12 elements.

All marmot remains have been tentatively assigned to the species *M. flaviventris* on the basis of present distribution. This species is the only marmot now living in the project area, and is a common resident of talus slopes. Marmots were exploited as a small game resource by ethnographic inhabitants of eastern Washington (Ray 1932; Post 1938). Their presence in this faunal assemblage may indicate prehistoric exploitation.

Spermophilus spp. (ground squirrels) 45-OK-250 -- 4 elements, 45-OK-4 -- 1 element.

Three species of ground squirrels are currently found in eastern Washington: *Spermophilus columbianus*, *S. washingtoni*, and *S. townsendii*. *S. columbianus* is larger than the other two and prefers more mesic habitats. *S. washingtoni* and *S. townsendii* are smaller and prefer sagebrush and grass zones to the south and east of the project area (Dalquest 1948:268; Ingles 1965:169). These elements could not be assigned to species. Ground squirrels have been reported as a food resource in the ethnographic literature (Ray 1932:82).

Thomomys talpoides (northern pocket gopher) 45-OK-250 -- 149 elements, 45-OK-4 -- 121 elements.

Thomomys talpoides is the only geomyid rodent in the project area. Because pocket gophers are extremely fossorial and there is very little evidence that they were utilized prehistorically or ethnographically, their presence in this assemblage may be considered fortuitous.

Perognathus parvus (Great Basin pocket mouse) 45-OK-250 -- 69 elements, 45-OK-4 -- 59 elements.

Perognathus parvus is the only heteromyid rodent known in the project area. Like the pocket gophers, *P. parvus* is most likely present as a result of natural agents of deposition.

Castor canadensis (beaver) 45-OK-250 -- 1 element, 45-OK-4 -- 1 element.

Beaver is a native inhabitant of a wide variety of riverine habitats in Washington (Dalquest 1948). There is ethnographic evidence that beaver were exploited (Post 1938), presumably for their pelts and as a food resouce, although neither is explicitly stated. Beaver teeth are known to have been used by the Coeur d'Alene to incise wood, bone, antler, and soft stone (Teit 1930).

Peromyscus maniculatus (deer mouse) 45-OK-250 -- 19 elements, 45-OK-4 -- 10 elements.

Deer mice are residents of all habitat types in the project area. There is no evidence that deer mice were ever utilized.

Microtus spp. (meadow mouse) 45-OK-250 -- 4 elements, 45-OK-4 -- 6 elements.

Three species of *Microtus* occur in the site area: *M. montanus*, *M. pennsylvanicus* and *M. longicaudus*. All three species inhabit marshy areas or live near streams. *M. montanus* can also be found in more xeric areas. None of the elements in this assemblage could be assigned to species. There is no evidence that microtine mice were culturally deposited.

Lagurus curtatus (sagebrush vole) 45-OK-4 -- 1 element.

Sagebrush voles inhabit dry sagebrush areas with little grass (Maser and Storm 1970:142). Only cranial material of this species is distinguishable from *Microtus* spp. The occlusal surface of M^3 (Maser and Storm 1970) and the location of the mandibular foramen (Grayson 1984) are distinctive.

Canis spp. (wolves, coyotes, foxes and dogs) 45-OK-250 -- 37 elements, 45-OK-4 -- 4 elements.

Both *Canis latrans* (coyote) and *C. familiaris* (domestic dog) are common in the project area today. *C. latrans* is an indigenous species, and *C. familiaris* has great antiquity in the northwest (Lawrence 1968). *C. lupus* (wolf) is also known to have been a local resident in the past, but has been locally extinct since about 1920 (Ingles 1965). Dogs were used ethnographically for hunting deer, but were not eaten except in emergencies (Post 1938). Coyotes, however, were considered good food (Ray 1932:90).

Mustela frenata (long-tailed weasel) 45-OK-4 -- 3 elements.

Long-tailed weasels are ubiquitous in Washington, and hunt small rodents by following them into their burrows. There is no reference to long-tailed weasels in the ethnographic literature.

Mephitis mephitis (striped skunk) 45-OK-4 -- 2 elements.

Striped skunks are common inhabitants of streamside thickets throughout the project area. As with the porcupine, there was no taboo against eating skunk among the ethnographic people (Ray 1932:90); but skunk was not popular in the diet.

Cervus elaphus (elk) 45-OK-250 -- 1 element, 45-OK-4 -- 4 elements.

The closest population of elk is in the Cascade Mountains to the west (Ingles 1965). Elk bones occur in low frequencies in many archaeological sites in eastern Washington, however, indicating that elk once occupied a more extensive range than at present and/or that people were traveling some distance to hunt them.

Odocoileus spp. (deer) 45-OK-250 -- 738 elements, 45-OK-4 -- 803 elements.

Two species of deer may be represented in this assemblage, Odocoileus hemionus and O. virginianus. Deer are thought to have represented a major food resource to the prehistoric inhabitants of eastern Washington (Gustafson 1972), as they did for the ethnographic cultures (Post 1938; Ray 1932).

Antilocapra americana (pronghorn antelope) 45-OK-4 -- 3 elements.

Although antelope are only present today in Washington as an introduced species (Ingles 1965), antelope remains are common in both historic and prehistoric archaeological sites, especially in the arid part of the Columbia Basin (Gustafson 1972; Osborne 1953). There are ethnographic records of hunting practices associated with antelope procurement (Ray 1932; Post 1938).

Ovis canadensis (mountain sheep) 45-OK-250 -- 57 elements, 45-OK-4 -- 77 elements.

Mountain sheep occur in archaeological sites in eastern Washington with some regularity. The presence of this species is somewhat difficult to interpret, however, because references to it in the ethnographic literature are scarce. Moreover, when competition with man and domestic stock for range became severe during historic times, the habitat preference of this species appears to have changed (Manville, in Monson and Sumner 1980). Mountain sheep are known ethnographically to have been exploited both for meat and as a source of bone and horn for tools (Spinden 1908).

REPTILIA (NISP=349 - 45-OK-250; NISP=158 - 45-OK-4)

Chrysemys picta (painted turtle) 45-OK-250 -- 215 elements, 45-OK-4 -- 127 elements.

Painted turtle is the only native turtle currently living in the project area. *Clemmys marmorata* (western pond turtle) has been reported in the eastern part of Washington in the ethnographic literature (Ray 1932:87), but this would represent a major extension of the known range of *C. marmorata*. At the present time, *C. marmorata* only occur on the west side of the Cascades and in the southern part of the state. Because there is no way of verifying that any other turtle has ever lived in the project area, and no indication that they were imported, all turtle remains have been assigned to *C. picta*. Turtles regularly were taken by ethnographically known people as a food source and used for utensils and ornaments. (Ray 1932:87). The incidence of burned turtle elements indicates they were utilized at this site.

Crotalus viridis (western rattlesnake) 45-OK-250 -- 3 elements.

Four species of colubrids and one of vipers are found in the project area today (Stebbins 1966). Genus and species level identification were not possible for members of the former family. The two families were distinguished largely on the basis of overall size and robustness of the vertebrae. Rattlesnakes tend to have larger, more robust vertebra. The identifications should, however, be viewed as tentative. All snake bones probably are present in the assemblage as a result of natural processes.

AMPHIBIANS (NISP=1 - 45-OK-250)

Ranidae/Bufonidae (frogs and toads) 45-OK-250 -- 1 element.

Both frogs and toads inhabit the project area (Stebbins 1966). Inadequate comparative material precluded assigning these elements to the correct family. Like the snakes, these elements appear to be intrusive.

PISCES (NISP=188 - 45-OK-250; NISP=608 - 45-OK-4)

Salmonidae (salmon, trout, whitefish) 45-OK-250 -- 176 elements, 45-OK-4 -- 580 elements.

These vertebrae could belong to any of at least eight species of salmonid fish known in the project area. All fish vertebrae with parallel-sided fenestrated centra were assigned to this family. Salmonid fish represented a major food resource for ethnographic tribes (Ray 1932; Post, in Spier 1938; Craig and Hacker 1940). The high incidence of burned and broken vertebrae in this assemblage indicates salmonid fish were utilized at the sites.

Catostomidae (suckers) 45-OK-250 -- 1 element, 45-OK-4 -- 1 element.

Cyprinidae (carp and minnows) 45-OK-250 -- 10 elements, 45-OK-4 -- 27 elements.

Inadequate comparative collections precluded more specific identifications of nonsalmonid fish vertebrae. Assignment to family was made on the basis of size; minnows tend to be smaller than suckers and thus have smaller vertebrae. At least seven species of cyprinid and four of catostomid occur in the project area. Some ethnographic groups did exploit these fish. For instance, the southern Okanogan exploited suckers actively during spawning season (Post 1938), although suckers are present in the Columbia and Okanogan rivers year-round and could be taken at any time. The recovered elements probably are present in the assemblage as a result of human activities.

DISCUSSION

SUBSISTENCE

Artiodactyl elements account for greater than 65% of the vertebrate remains from both sites. Most of these specimens are from the small artiodactyls (deer, mountain sheep, pronghorn); only eleven specimens from both sites could be assigned to the elk or elk-sized (cow, elk, bison) categories. Relative frequencies show deer (Odocoileus spp.) account for more than 90% of the small artiodactyl elements identified at least to genera in both sites. Most of the remaining artiodactyl elements are mountain sheep; pronghorn occur in very low frequencies. The relative abundance of small artiodactyl bones, as well as the occurence of evidence of butchering and burning indicate that small artiodactyls are the primary vertebrate resource exploited at these sites.

Frequencies of burned bone and butchering marks by elements and taxon are shown by site and zone in Table 4-2. Nonartiodactyl taxa (Marmota flaviventris, Chrysemys picta and salmonid fish) are included in the table

Table 4-2. Culturally modified bone, 45-OK-250 and 45-OK-4.

	45-OK-250 Zone													45-OK-4 Zone								
	51				52				53				Total	51		52				53		Total
Element	B[1]	1	2	6	B	1	2	5	B	1	2	5		B	2	B	1	2	5	B	5	
Marmota flaviventris																						
Ulna	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Astragalus	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
***Odocoileus* spp.**																						
Skull	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-	-	2
Mandible	5	-	-	-	6	1	2	-	-	-	1	-	15	-	-	-	2	3	-	-	-	5
Tooth	-	-	-	-	9	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-
Scapula	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Metacarpal	-	-	-	-	-	-	1	-	-	-	1	-	3	-	-	-	-	1	-	-	-	1
Innominate	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Tibia	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
Astragalus	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	1	-	-	-	-	1
Metatarsal	-	-	1	-	-	-	2	2	-	-	2	-	7	-	-	1	-	-	3	-	-	4
Metapodial	3	-	-	-	3	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
Phalanx	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Cervid																						
Antler	-	-	-	-	2	-	-	2	-	-	-	-	4	-	-	-	-	-	2	-	-	2
Antilocapra americana																						
Metacarpal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Ovis canadensis																						
Humerus	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Ulna	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-
Metacarpal	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	1
Astragalus	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	3	-	-	-	-	3
Metatarsal	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-
Deer-Sized																						
Skull	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	-	1
Mandible	2	-	-	-	6	-	2	-	-	-	-	-	10	-	-	1	2	-	-	-	-	3
Vertebra	3	-	-	-	9	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
Rib	8	1	-	-	29	-	-	-	-	-	-	-	38	-	-	-	3	-	-	-	-	3
Scapula	-	-	1	-	4	-	-	-	-	-	-	-	5	-	-	1	-	-	-	-	-	1
Humerus	1	-	5	1	5	-	11	-	-	-	-	-	23	-	-	1	-	26	-	-	-	27
Ulna	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Radius	1	-	-	-	-	-	6	1	-	-	2	-	10	-	-	2	-	14	-	-	-	16
Metacarpal	4	-	-	-	1	1	7	-	-	-	2	-	15	-	-	6	1	7	1	-	1	16
Innominate	1	-	-	-	5	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-
Femur	-	-	2	-	2	-	11	-	-	-	1	-	16	-	1	-	1	14	-	-	-	16
Tibia	1	-	1	-	1	-	19	1	-	-	3	-	24	-	2	3	-	18	-	-	-	23
Astragalus	2	-	-	-	-	-	-	-	2	-	-	-	4	-	-	-	-	-	-	-	-	-
Metatarsal	-	-	1	-	4	1	22	4	1	-	3	1	37	1	-	-	-	8	3	-	-	12
Metapodial	2	-	-	-	2	-	4	1	-	-	-	-	9	-	-	1	-	3	-	-	-	4
Phalanx	2	-	-	-	1	-	-	-	-	-	-	-	3	-	-	3	-	-	-	1	-	4
Elk-Sized																						
Metapodial	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
Chrysemys picta																						
Skull	11	-	-	-	6	-	-	-	1	-	-	-	18	-	-	-	-	-	1	-	-	1
Salmonid																						
Vertebra	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	6	-	-	-	-	-	6
Total	51	1	10	1	102	3	88	11	4	2	20	1	294	2	3	28	15	95	11	2	1	155

[1] B=burned, 1=striae, 2=flake, 5=artifact, and 6=flake and striae.

solely on the basis of burned bone, with the exception of turtle shell in Zone 52 of 45-OK-4. This turtle shell and other bone elements that were considered artifacts were discussed in Chapter 3 and will not be considered further here. Otherwise, all burned and butchered elements are from small artiodactyls. When considered collectively, there are burned and/or butchered elements from all parts of the small artiodactyl skeleton. Highest frequencies occur in the densest elements, as would be expected if frequencies are a function of preservation. The range of elements included in Table 4-2 indicates entire animals were brought to the site for processing. Because the greatest range of elements bearing evidence of butchering or burning occurs in the taxon with the greatest NISP (deer) and decreases with decreasing NISP through mountain sheep and pronghorn, the occurrence of evidence of use is, apparently, directly related to the number of elements representing the taxon. Further inference regarding differences in patterns of use among the three small artiodactyls is, therefore, meaningless.

The regular occurrence of marmot (*Marmota flaviventris*) elements in all zones and the occurrence of burned marmot elements in Zones 51 and 53 of 45-OK-4 may indicate that marmots were being regularly exploited in small numbers. There is no indication that any of the other mammalian taxa are present because they were being used. However, the single element identified as beaver (*Castor canadensis*) is an incisor. Beaver incisors are an excellent tool material, and may represent use of the animal for tools. The lack of other beaver elements at these sites suggests the incisors were curated or brought to the site from elsewhere. However, it is unlikely that a fur bearing animal such as beaver was sought solely for its incisor teeth. Rabbits (*Sylvilagus nuttallii*) and ground squirrels (*Spermophilus* spp.) are also known mammalian resources in this area (Ray 1932; Spier 1938; other reports in this series), but the low freqency of these taxa in these two sites makes their presence difficult to attribute to cultural activities. Both are common residents of the project area.

Turtle (*Chrysemys picta*) shell fragments occur with some regularity in all three zones in both sites. The occurrence of burned and worked turtle shell in Zones 51 and 53 in 45-OK-4 along with the regularity of these elements suggest turtles were regularly used by site inhabitants.

Fish, especially salmonids, comprise a high percentage of the vertebrate remains, 7% of the total NISP in 45-OK-250 and 20% in 45-OK-4. Highest relative abundances are in Zone 52 of both sites, 21.7% and 9.6% respectively. A single otolith from Zone 51 of 45-OK-250 suggests the salmonid remains may indicate exploitation of the spawning run of Chinook salmon (*Onchorynchus tshwaytscha*). Chinook salmon may be present in the project area from mid-March through September (Schalk 1978).

SEASONALITY

If the assumption is made that the faunal remains were deposited by the activities of people during the season(s) when each taxon is naturally available, the season of site occupation may be inferred from the occurrence of certain faunal remains. Aside from the possibility of anadromous fish mentioned above, two kinds of data that indicate season of site occupation were recovered from the faunal assemblage. The first is seasonally active taxa. Elements from two such taxa--marmots (Marmota flaviventris) and painted turtle (Chrysemys picta)--are present in the assemblages from both sites. Marmots are active during the late winter/early spring months. They estivate during the summer and may go directly into hibernation for the winter or may be active for a short time in the fall. The time of their greatest availability is between February and June, but this may vary slightly according to the local climatic conditions (Ingles 1965; Dalquest 1949). Painted turtles hibernate from late October until March or April (Stebbins 1966; Ernst and Barbour 1972). They are available during the spring and summer months.

Age at death of individuals of taxa with a known season of birth may also be used to infer season of site occupation. The ages at death for a total of 40 deer from both sites have been estimated by reference to criteria described by Robinette et al. (1957) and Severinghaus (1949). Ages at death for two mountain sheep were estimated by reference to criteria described by Deming (1952). Deer and mountain sheep generally give birth in May or June (Ingles 1965). The seasons of site occupation indicated by each of the seasonally sensitive taxa are displayed in Table 4-3. The range of months indicated by deer and mountain sheep has been extended to include several months because the wear pattern from which age is assessed is highly variable. Not only does dental wear depend on location of the population and forage type, but variation increases with age of the animal.

In Zone 51 of 45-OK-250, the seasonal indicators are marmots and painted turtles, plus seven ageable deer and one ageable mountain sheep, suggesting occupation during all seasons of the year. In Zone 51 of 45-OK-4, the only seasonal indicators are marmots and painted turtles, suggesting occupation at least during late winter/early spring and perhaps through summer.

Zone 52 in both sites contain the most faunal indicators of seasonality. The specimens indicate occupation of the sites in all seasons except possibly mid-winter (November-January).

There are faunal specimens indicative of season of occupation in Zone 53 only from 45-OK-4. These specimens again suggest the site was occupied throughout the year, except perhaps during mid-winter.

SUMMARY

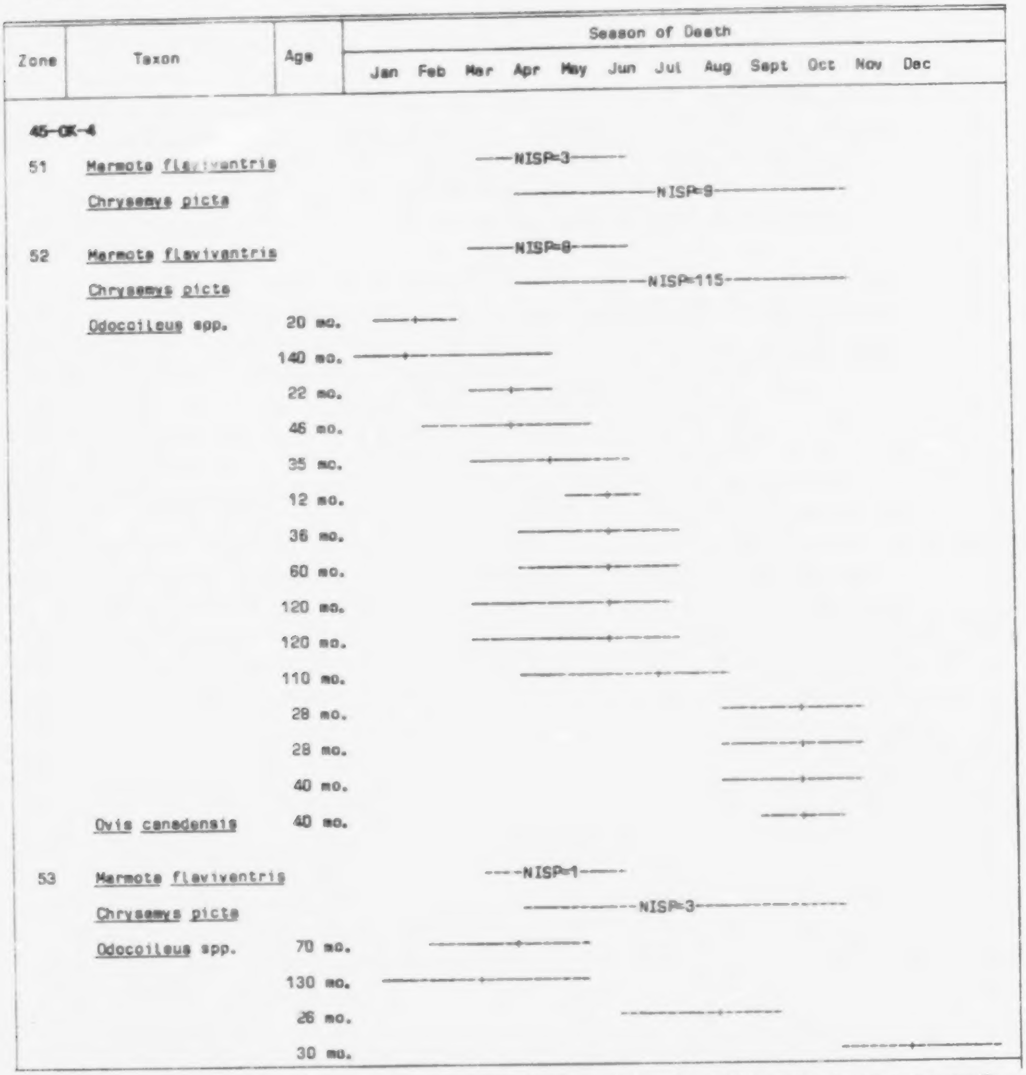
Small artiodactyls appear to be the primary mammalian resource of people using these sites as indicated by overall abundances and evidence of butchering. Deer occur in the greatest numbers, though mountain sheep and pronghorn were used as well. Other mammalian taxa that may have been exploited by site occupants include elk, marmots, squirrels, rabbits and beavers. Nonmammalian resources include salmonid fish and painted turtles.

Seasonally active taxa and ageable individuals of taxa with a known season of birth suggest these sites were occupied year-round, at least during the time that Zone 52 was deposited. The smaller numbers of identified specimens in Zones 51 and 53 for both sites preclude inferring shorter annual occupations for these zones in either site.

Table 4-3. Distribution of seasonal indicators, 45-OK-250 and 45-OK-4.

Zone	Taxon	Age	Season of Death[1]											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
45-OK-250														
51	Marmota flaviventris				—	NISP[2]=1	—	—						
	Chrysemys picta					—	—	NISP=88	—	—	—	—		
	Odocoileus spp.	20 mo.	+	—										
		11 mu.				—	+							
		36 mo.				—	—	+	—					
		16 mo.									—	+		
		28 mo.							—	—	—	+	—	
		18 mo.											+	—
		30 mo.										—	+	—
	Ovis canadensis	46 mo.		—	+	—	—							
52	Marmota flaviventris				—	NISP=4	—	—						
	Chrysemys picta					—	—	—	NISP=16	—	—	—		
	Odocoileus spp.	80 mo.	—	+	—									
		11 mo.				—	+							
		24 mo.					—	+						
		36 mo.				—	—	+	—					
		60 mo.				—	—	+	—					
		14 mo.							+	—				
		16 mo.								—	+	—		
		40 mo.								—	—	+	—	
		17 mo.									—	+	—	
		12 mo.									—	+	—	
		30 mo.								—	—	+	—	—
		42 mo.								—	—	+	—	—
		90 mo.								—	—	+	—	—
		7 mo.											+	—

Table 4-3. Cont'd.



Zone	Taxon	Age	Season of Death
45-OK-4			
51	Marmota flaviventris		NISP=3
	Chrysemys picta		NISP=9
52	Marmota flaviventris		NISP=8
	Chrysemys picta		NISP=115
	Odocoileus spp.	20 mo.	
		140 mo.	
		22 mo.	
		46 mo.	
		35 mo.	
		12 mo.	
		36 mo.	
		60 mo.	
		120 mo.	
		120 mo.	
		110 mo.	
		28 mo.	
		28 mo.	
		40 mo.	
	Ovis canadensis	40 mo.	
53	Marmota flaviventris		NISP=1
	Chrysemys picta		NISP=3
	Odocoileus spp.	70 mo.	
		130 mo.	
		26 mo.	
		30 mo.	

[1] Because reliability of estimates for artiodactyls decreases with increasing age, we use a two month span for season of death for individuals ≤24 months, a four month span for individuals >24 months and <100 months, and a five month span for individuals ≥100 months.

[2] Number of Identified Specimens.

5. BOTANICAL ANALYSIS

The study of vegetable materials found in archaeological matrices, termed archaeobotany or paleoethnobotany, (Dennel 1976; Dimbleby 1967; Ford 1979; Renfrew 1973) provides valuable information about the resource base of peoples who inhabited a site. With lithic and faunal materials, they give us the means for making inferences about the patterns of subsistence, as well as interpreting site features. The presence and condition of specific kinds of fruit seeds and flower parts, for instance, can suggest seasonality of site use.

Analysis was conducted only on material from 45-OK-250 where 32 flotation samples and 22 radiocarbon or miscellaneous (carbon) samples were taken from over 50.2 kg of sediment. Samples from 45-OK-4 await analysis. Flotation procedures are described in detail in the project's research design (Campbell 1984d).

Flotation and carbon samples were taken from various features in Zones 52 and 53 (13, 14, 15, and 24). Samples from Zone 13 and Zone 14 are from Housepit 1, the dump strata, and features associated with those cultural deposits. Over 66% of the flotation and carbon samples are from these structures, and the carbon comprises 74% of the site assemblage by weight (Table 5-1). Fourteen of the zone's 21 flotation samples are from Housepit 1 postmolds, providing the most extensive sample of postmold contents in the Rufus Woods Reservoir area.

Three flotation samples are from matrix associated with a hearth area (Firepit 1, F87) in Zone 24, and 10 samples are from Zone 15. The Zone 13 and Zone 15 assemblages are similar in content and condition. Zone 24 botanical materials are a little different from those of the other zones--Zone 24 flotation samples have more hardwood; and all the specimens are charred.

All but one of the flotation samples were subjected to water flotation, and standard subsamples (2.0-1.0 mm at 0.10 g) were drawn from flotation samples and carbon samples alike. The site's average ratio of carbon to sediment is approximately 0.3% and the average purity rating about 67%. Because only 17 of the flotation samples were weighed before flotation, we could compute carbon ratings for only 53% of the samples. Fully 3.76 g of archaeobotanical materials were identified. The array by weight consists of 83% conifer, mostly pine family members; 15% hardwoods; 1% edible material; and 1% non-woody herbaceous tissue. The difference between the flotation sample and carbon assemblage are shown in Table 5-1. The flotation samples have fewer hardwoods (13% vs. 17% for carbon samples), and 2% edible material

Table 5-1. Botanical assemblage by zone , weight (g), and number of appearances (#), 45-OK-250.

Assemblage	Summary zone 53						Summary Zone 52								Total			
	Zone 15				Zone 24		Zones 13 & 14											
							Housepit 1 and Associated Matrix				Dump Stratum II and Associated Features							
	Flots (N=3)		Carbon (N=7)		Flots (N=3)		Flots (N=21)		Carbon (N=9)		Flots (N=5)		Carbon (N=6)		Flots (N=32)		Carbon (N=22)	
	g	#	g	#	g	#	g	#	g	#	g	#	g	#	g	#	g	#
Conifer (83%)																		
Lodgepole pine	0.12	3	0.13[1]	2	-	-	0.19[1]	9	0.09[1]	2	0.02	1	0.03	1	0.33	13	0.25	5
Ponderosa pine	0.11[1]	2	0.29[1]	3	-	-	0.42[1]	15	0.39[1]	4	0.07	2	0.10	1	0.60	19	0.78	8
Yellow pine	-	-	0.01	1	0.02	3	0.11[1]	7	0.07[1]	2	0.02[1]	2	-	-	0.15	12	0.08	3
Douglas fir		-	0.08[1]	2	-	-	0.01	5	0.16[1]	3		-	0.20[1]	2	0.01	5	0.44	7
Larch	-0.01	1	0.10[1]	1	-	-	0.07[1]	4	0.03	1	-	-			0.07	5	0.13	2
Hemlock		-	-	-	-	-	-	-	-	-	0.01[1]	2	-	-	0.01	2	-	-
Pinaceae	-	-	-0.01	1	-	-	0.03[1]	2	-	-	-	-	-	-	0.03	2	-0.01	1
Bark	0.01	2	-	-	-	-	0.10[2]	16	0.01	1	0.03	2	0.03	2	0.14	20	0.04	3
Cone	-	-	-	-	-	-	-0.01	1	-	-	-	-	-	-	-0.01	1	-	-
Pitch	0.01	1	0.03	1	-	-	0.01	4	-0.01	2	-	-	-0.01	1	0.02	5	0.03	4
Other wood	-	-	-	-	0.01	1	0.01	3	-0.01	1	-	-	-	-	0.02	4	-0.01	1
Hardwood (15%)																		
Oceanspray	-	-	-	-	-0.01	2	-	-	-	-	-	-	-	-	-0.01	2	-	-
Bitterbrush	-	-	0.02	1	-	-	-0.01	2	-	-	0.15	3	0.12	2	0.15	5	0.14	3
Serviceberry	-	-	-	-	0.02	2	-0.01	2	-	-	-	-	-	-	0.02	4	-	-
Rosaceae	-	-	-	-	-	-	0.01	1	-	-	-	-	-	-	0.01	1	-	-
Mock orange	-	-	-	-	0.01	2	-0.01	1	-	-	-	-	-	-	0.01	3	-	-
Poplar	-	-	-	-	-	-	-	-	-	-	0.01	1	-	-	0.01	1	-	-
Willow	-	-	-	-	-	-	-	-	0.08	2	-	-	-	-	-	-	0.08	1
Poplar/willow	-0.01	1	-	-	-	-	-0.01	1	-	-	-	-	-	-	-0.01	2	-	-
Hackberry	-	-	-	-	-	-	-	-	-	-	-0.01	1	-	-	-0.01	1	-	-
Birch	-	-	-	-	-	-	-	-	0.04	1	-0.01	1	-	-	-0.01	1	0.04	1
Bark	-	-	-	-	-	-	-0.01	2	-	-	-0.01	1	0.10[2]	1	-0.01	3	0.10	1
Other	-	-	-	-	0.01	1	-	-	-	-	-	-	-	-	0.01	1	-	-
Edible Material (1%)																		
Seeds	-	-	-	-	-	-	0.02	9	-	-	0.01	3	-	-	0.03	12	-	-
Root	-	-	-	-	-	-	-0.01	3	-	-	-	-	-	-	-0.01	3	-	-
Other	-	-	-	-	-	-	-0.01	1	-	-	-	-	-	-	-0.01	1	-	-
Other Tissue (1%)																		
Seeds	-	-	-	-	-0.01	2	-0.01	4	-	-	-	-	-	-	-0.01	6	-	-
Grass	-	-	-	-	-	-	-0.01	1	-	-	-	-	-	-	-0.01	1	-	-
Leaf	-	-	-	-	-	-	-	-	-	-	0.01	1	-	-	-0.01	1	-	-
Herbaceous stem	-0.01	1	-	-	0.01	3	0.02	6	-	-	-	-	-	-	0.03	10	-	-
Total	0.25		0.66		0.08		1.00		0.87		0.32		0.58		1.65		2.11	

[1] Samples with incompletely carbonized wood.
[2] Cedar and birch bark in these samples.

and 2% herbaceous tissue. The carbon samples had no identified edible or other non-woody tissue. Since most of the flotation samples at 45-OK-250 were screened to obtain carbon samples, it seems clear that the carbon fraction above 3.2 mm is heavily biased in favor of wood charcoal.

The pine family is well represented at 45-OK-250 with four of six genera present along with pine bark, a male cone fragment, and pitch lumps. Ponderosa pine is the most important wood at the site and appears in 59% of flotation samples and 36% of the carbon samples. Lodgepole is second and yellow pine is third in importance at the site. If all three of its taxa are added together, yellow pine appears in all but three flotation samples and four of the carbon samples. It is present in all features except one hearth, Firepit 3, that is below Dump Stratum II and Firepit 2 on the eastern periphery of Housepit 1. Douglas fir and larch appear in 16% of the flotation samples. When carbon samples are considered, Douglas fir is more abundant by wieght and appears more often than larch. The absence of cypress family woods also is notable--only one piece of bark was found, probably red cedar, was found. Most of the other sites in the project area contain both cedar and juniper. Juniper is available in small amounts in draws today, and red cedar was common in river drift before Grand Coulee Dam was constructed (Ray 1932; Thalheimer, personal communication 1983).

Hardwoods are poorly represented in the flotation samples and carbon samples. Bitterbrush, which appears in 16% of the flotation samples and 14% of the carbon samples, is the only hardwood which occurs in any quantity, but even so it is far less abundant than Douglas fir. All the bitterbrush is charred, so we assume it was used as fuel. Sage is absent--45-OK-250 is the only site in the project area that lacks sage in its botanical assemblage. Bitterbrush and most of the remaining hardwoods are available locally today, either as members of the terrace flora, or in draws and talus a relatively short distance away. The exceptions, oceanspray (*Holodiscus discolor*) and birch (*Betula occidentalis*) grow in the moister habitats of higher elevations. Oceanspray for instance, which is found in Zone 14, appears above 600 m (2,000 ft) under pine and Douglas fir. Used in the construction of bows and arrows, it may have been brought to the site for use in tool manufacture.

Zone 13 yielded all of the edible seeds and edible tissue. Most of it is from Housepit 1 and from matrix (F73) adjacent to the structure. Other edible material is found in Pit 1 below Dump Stratum II. The seed material consists of six western goosefoot seeds (*Chenopodium fremontii*), four smaller goosefoot seeds (*Chenopodium* sp.), three samples of crushed or broken hawthorn stones (*Crataegus* sp.), two nearly entire service berry seeds (*Amelanchier alnifolia*), one partial wild cherry pit (*Prunus* sp.), and fragments of a probably common sunflower achene (*Helianthus annuus*). Edible tissue is represented by a small amount of camas (*Camassia* sp.) tissue, two samples of root, probably *Lomatium* sp., and charred tissue thought to be from fleshy fruits. The western goosefoot seeds are familiar from two sites--45-OK-11, and 45-OK-258. This is the third, and possibly oldest, site to hold the remnants of sunflower seeds. (Other sunflower seeds were found at 45-OK-288 and 45-OK-2.) Camas tissue appears for the first time. Found with other root tissue in Postmold 4 in Housepit 1, it is at least 3,000 years old. Camas is not common in the project area today, and is confined to the eastern half of the reservation. The find, then, is important for its antiquity.

The following sections describe the botanical assemblage from 45-OK-250 by taxa and briefly discuss the subassemblages of each analytic zone.

BOTANICAL ASSEMBLAGE

The assemblage presented below is arranged alphabetically by family. Possible uses are suggested from information supplied in the ethnobotanical and ethnographic literature. Seasonality data are included where pertinent.

APIACEAE (Umbelliferae, Parsley or Celery Family)

Lomatium Raf. (desert parsley, biscuitroot, "white" camas, cous)

Charred starchy root tissue, probably of the genus Lomatium, was identified from three flotation samples from Zone 13. These came from the floor of Housepit 1, from Postmold 4 in the floor, and from the matrix adjacent to the floor. Radiocarbon dates from the floor as well as Postmold 10 indicate that the root tissue dates from 2989±76 B.P. to 3219±95 B.P.

Lomatium roots were collected in the early spring from March through June (Turner et al. 1980:64-65, 68-69). Some were eaten fresh, boiled, dried, or pit cooked with other foods. At least one kind was made into cakes and dried for winter use (Turner et al. 1980:68). In all three flotation samples, the tissue was found with other edible materials--once with a small amount of charred camas tissue, once with hawthorn pit fragments and western goosefoot seeds and once with western goosefoot and fruit tissue. The harvest of these food varies from early summer to fall, and all could be stored for winter use.

ASTERACEAE (Daisy Family)

Helianthus annuus L. (sunflower, common sunflower)

A portion of a sunflower seed was identified from occupation debris in Pit 1 below Dump Stratum II. The flotation sample (Flotation sample 41) was from UL 210, and showed no evidence of bioturbation. The seed remains occurred with three species of conifer and two of hardwoods. A portion of pine needle and conifer bark was also present. A radiocarbon date from Feature 95, Dump Stratum II, dates the contents at 3323±105 B.P.

BETULACEAE (Birch Family)

Betula L. (birch)

Charred birch wood was found in one carbon sample from an older floor remnant or occupation surface (F125) truncated by Housepit 1, and in a flotation sample from Pit 1 In addition, a small unworked roll of stained birch bark about 17 mm long (M#1918) was recovered from Dump Stratum II (F95). Its thickness is approximately that of unsplit birch bark from a medium sized tree. The bark does not appear to have been culturally modified. Some portions of it are darkened due to age or perhaps light charring.

CHENOPODIACEAE (Goosefoot Family)

Chenopodium _fremontii_ Wats (western goosefoot, pigweed)

Six charred western goosefoot seeds were identified in four flotation samples from Zone 13. All were from the region of Housepit 1. Three of the seeds are from postmoids (PM 12 and 14), two are from the floor, and one was found in matrix adjacent to the floor (Feature 73). None of the seeds is complete, and fragments of the coats were found with other edible materials (see above under _Lomatium_ sp.).

This is the third site to contain the seeds of western goosefoot. A possible cache of the charred seeds was found in a pit feature at 45-OK-258 (Jaehnig 1983b), and others have been identified from Kartar and Hudnut phases at 45-OK-11 (Lohse 1984f). The concentrations here and at 45-OK-11 were not large enough to discount the possibility of accidental intrusion. The goosefoot genus contains many weedy species that tolerates campsites and wasteplace. There is no record of use for _Chenopodium_ _fremontii_ in the literature of the Columbia Plateau. However, the concentration at 45-OK-258 strongly suggests economic use. _Chenopodium_ seeds were stored by the Cahuilla Indians of California in recent times (Bean and Saubel 1972:52-53), and seeds and leaves of many species have been eaten throughout history in many areas of the world (Asch and Asch 1977; Renfrew 1973; Simmonds 1965).

Chenopodium sp.

Three small goosefoot seeds (species unknown) also were recovered from Housepit 1. Two were found with western goosefoot seeds in Postmold 12, and one accompanied a serviceberry seed in Postmold 11. The flotation samples were free of bioturbation. The seeds themselves are small, about 0.7 mm to 0.0 mm across the beak, and are slightly tear-shaped. It is possible that the species represented is _C. album_, a species whose pre-Columbian presence in the New World has not been satisfactorily demonstrated, (Fernald 1970:594; Turner et al. 1980:96 or refuted (Yarnell 1964:92-93). Until a concentration of these small seeds is found and measurements are made on a large scale, no species determination can be made.

CUPRESSACAEAE (Cypress Family)

Thuja plicata ? (red cedar)

A trace of charred cedar bark was found in matrix adjacent to Housepit 1 (F73). The sample is very small and is probably that of red cedar.

Red cedar logs were a common drift material before the construction of Grand Coulee Dam. The wood was used to construct water craft, paddles and other implements (Ray 1932:68-69, 75, 118; Post and Commons 1938:53, 56-57, 60). The bark was used as insulation in winter lodges (Post and Commons 1938:39).

HYDRANGEACEAE (Hydrangea Family)

The only sample of mock orange charcoal was discovered in the matrix adjacent to Housepit 1 (F73). Mock orange is a common bush in canyons, draws and at the base of talus slopes and rocky outcrops. The wood was valued for bows and arrow tips (Ray 1932:89).

LILIACEAE (Lily Family)

Camassia Lindl. (Camas, "black" camas, blue camas)

A small amount of camas bulb was identified from Postmold 4, in Housepit 1. The sample also contained starchy root material, probably *Lomatium* tissue, along with incompletely carbonized ponderosa pine, bark and a bitterbrush seed fragment.

We have searched for camas tissue in our flotation samples, and this is the only sample positively identified in the Rufus Woods Lake Reservoir samples. The smallness of our sample (less than 0.01 g) precludes assigning it to one of two species (*Lomatium quamash*, *L. leichtlinii*) known from east of the Cascade Mountains (Hitchcock et al. 1969, Vol 1:780-782). The name "camas" is used in this area to mean bulbs of different plants--including *Lomatium canbyi*, white camas and other bulbs. The term "black" camas refers to bulbs in the Camassia genus which turn dark after steaming (Turner et al. 1980:41). To the best of our knowledge, "black" camas has not been found east of the Sanpoil River on the Colville Reservation. Although camas was a prized root among the Sanpoil and Nespelem (Turner et al. 1980:41-44) the major recognized camas gathering grounds appear to occur east of a line connecting the Sanpoil and the town of Creston, Washington and east into Idaho (Turner et al. 1980:41; Statham 1975). Camas collected on the outskirts of Creston was identified as *Camassia quamash* var. *quamash*. The plants flower in early June, and their harvest follows that of most lomatiums, bitterroot and wild onions. We have found no black camas in the vicinity of the Rufus Woods Lake Reservoir; its presence at 45-OK-250 three thousand years ago may be the result of trade or fairly long distance gathering expeditions.

PINACEAE (Pine Family)

With the possible exception of 0.02 g of unknown conifer found in four flotation samples and a carbon sample, all the wood, bark, and pitch at the site is from four genera in the pine family. Several wood samples from Zones 13, 14, and 15 contain specimens which are incompletely charred (Table 5-1).

The pine family is well represented at 45-OK-250. All genera but true fir (Abies spp.) and spruce (Picea spp.) were found. Representatives appear in every sample from Zones 15, 24, and Housepit 1, Zone 13. The only feature lacking pinaceous representation is Firepit 2 below Dump Stratum II.

Larix occidentalis Nutt. (western larch, tamarack)

Larch occurs in 13% of the samples and is fifth among the conifers. Most of the semi-charred wood is from Housepit 1 postmolds (13, 12 and 14). Because the wood is found with other wood taxa, we could not determine if the wood was part of the structure. The wood was not highly valued as construction material (according to the ethnographic record), but it is a good fuel species.

Pinus contorta Dougl. ex Loud. (lodgepole pine)

Charred and semi-charred lodgepole pine wood is the second most important wood at 45-OK-250 by weight and number of appearances. It is found in 33% of the samples as a whole, 41% of the flotation samples, and in all zones but Zone 24. Samples of charred and uncharred pine are dated with the postmolds at from 2898±76 B.P. to approximately 3219±95 B.P. Those from the dump, about the same age, are completely charred.

Young lodgepole pines are suited for construction purposes. The trees are found at higher elevations than are ponderosa pines on the Colville Reservation.

One might expect that lodgepole was used in the construction of the posts of Housepit 1. Like larch, however, it is usually found with other wood taxa, and in no case is it the major species of the groups by subsample weight.

Pinus ponderosa Dougl. ex Loud. (ponderosa pine)

At 1.38 g, ponderosa pine is the most common wood at 45-OK-250. It is found in 50% of the samples in charred and semi-charred state. The oldest ponderosa consists of incompletely charred mature bole wood with resin dated to 4448±123 B.P. The pine is found in all represented Zones but 23, and in 14 out of 18 features examined. Every postmold in Housepit 1 has ponderosa pine, and two (PM 4 and 11) have it as the major taxa of the samples and the only conifer wood, suggesting post remains.

Ponderosa pine is the largest tree within walking distance of the site and a few mature individuals can be seen on the terraces and hillsides on both sides of the reservoir. Pine has various used in native manufactures, medicinal substances and food (nuts and cambium). Most of it, however, was probably consumed as fuel.

Yellow Pine

The term yellow pine is used when we cannot determine if a sample is lodgepole or ponderosa pine. The yellow pine taxon is the fourth most important wood by weight, and the third most important in terms of appearances in the samples. It is found in all zones and in 28% of the samples.

Pseudotsuga menziesii (Mirb.) Franco (Douglas fir)

Charred and semi-charred Douglas fir wood is found in all Analytic Zones but 24, and in 12 or 22% of the samples. Douglas fir is third in importance behind lodgepole pine in weight. All of the flotation sample material is from Housepit 1.

Douglas fir trees currently grow among ponderosa pines above the floodplain and in draw bottoms close to Rufus Woods Lake. A few individuals can be seen across from the site, growing on north-facing mountain slopes. The wood was made into harpoon shafts and other implements (Post and Commons 1938:55-56), as well as teepee poles and spear shafts (Turner et al. 1980:35).

Tsuga Carr. (hemlock)

Hemlock is one of the more exotic woods from 45-OK-250. We have been unable to find evidence of it growing on the Colville Reservation today. The closest abundant source by river may be in British Columbia, in the Arrow and Slocan Lakes region (Hosie 1979:78).

A small amount of incompletely charred hemlock was identified from two flotation samples from Pit 1

Use of this wood is not reported in the ethnographic or ethnobotanical literature of our area.

Other Pinaceae

Three samples have charcoal which belong to the pine family, but cannot be assigned further. These are found in a carbon sample from Zone 15, and in two flotation samples from Housepit 1.

Cone, Bark, Pitch and Other Conifer Wood

A small piece of male pine cone was identified from matrix adjacent to Housepit 1. These structures are fragile compared to seed-bearing cones, and this is the only example from the entire Rufus Woods assemblage. Pieces of charred or melted pitch are found well scattered through the zones and features. The coniferous woods are distinguished by resin canals (Pine, larch, and Douglas fir).

Charred conifer bark is present in 43% of all samples. Conifer bark is particularly common in the postmolds of Housepit 1. Seven of the post molds have bark; only two of 14 flotation samples from them have no bark at all. Because the postmolds contain several woody and non-woody taxa, it may be that the bark is general floor debris rather than the remnants of posts. Turn of the century photographs showing mat houses and other structures in the Nespelem area (Gidley 1979), show more barkless than bark-covered poles.

POACEAE (Gramineae, Grass Family)

A trace of grass was found in Dump Stratum II, Zone 13.

ROSACEAE (Rose Family)

The Rose family is moderately well represented at 45-OK-250. Combining all taxa, approximately 0.22 g of charcoal was identified from 19, or 35%, of the samples. Most of the material is from the Zone 13 dump area; associated features had more than twice as many samples with family members than Housepit 1 (64% vs. 30%).

Amelanchier alnifolia Nutt. (serviceberry, saskatoon)

There is little serviceberry charcoal from 45-OK-250. Traces are found in two flotation samples from Firepit 2, just outside of Housepit 1, and a floor or occupation surface (F125) pre-dating Housepit 1, and 0.02 g are from two flotation samples in Zone 24. In addition, two charred seeds were

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identified from postmolds (PM 1 and 4). The seeds were accompanied by goosefoot seeds.

Serviceberry wood is suited for small items of manufacture, such as digging sticks, arrow shafts, and the like (Ray:1932:98; Post and Commons 1938:53,55,58,60). The wood is commonly available in draws and along talus slopes and rocky outcrops. Serviceberries, an important item of aboriginal diet (Ray 1932:101), ripen during the last two weeks of June to early July at low elevations. Serviceberries were one of several fruits dried for winter use (Turner et al. 1980:123).

Crataegus L. (Hawthorn, haw)

Three flotation samples from Zone 13 contained probable fragments of hawthorn seeds. One flotation sample came from the floor of Housepit 1, the second come from the bottom of Pit 1 and the third was taken from matrix (F73) adjacent to Housepit 1. The first two flotation samples contained other edible species, goosefoot seeds, and root tissue (probable lomatium tissue from Housepit 1 flotation sample).

According to Ray (1932:103), two species of hawthorn berries were gathered from August onward through fall, eaten fresh, mashed in a mortar and stored for a short time. Turner (et al. 1980:124-125), however, states that at least one species (*C. douglasii*) was dried for winter use.

Holodiscus discolor (Pursh) Maxim. (oceanspray, ironwood)

Charred oceanspray wood was found in two of three flotation samples from occupation debris (F87) in Zone 24.

Ray reports that oceanspray was an important bow wood (1932:87-88) and arrow shaft material (1932:89, footnote 16). The wood is currently available under mixed coniferous forest above 600 m.

Prunus L. (wild cherry)

A fragment of cherry pit was identified in the matrix below Dump Stratum II (F115). The species could not be determined; however, the pit may belong to chokecherry since draws are dotted with the bushes near the site. Wild cherries were gathered in quantity in August, and pitted and dried for winter use (Ray 1932:101). Alternately, they could be mashed, seeds and all, and then dried. Sometimes entire branches of the fruit were stored (Turner et al. 1980:128).

Purshia tridentata (Pursh) D.C. (bitterbrush, greasewood)

Charred bitterbrush wood is the most common hardwood at 45-OK-250. It is found in only 15% of the samples, and is fourth in weight behind Douglas fir. Most of it is scattered among the features associated with Dump Stratum II. Very little is found in Housepit 1 where it might be expected as part of fire hearth debris.

In addition, two probable bitterbrush seed fragments were found in Housepit 1 postmolds (PM 3,4) One of these (PM4) also contained traces of camas tissue. Both camas and bitterbrush ripen or could be gathered in June. The traces of bitterbrush wood from Housepit 1 are from different post holes (PM 1,10) and the seeds may have been brought in with it.

Bitterbrush wood was not utilized for tools or other manufactured items; and the southern Okanogan reportedly used it to give hot fire in the initial stages of pit cooking (Turner et al. 1980:128).

Other Rosaceae

A small amount of roseaceous charcoal was found in one flotation samples from Postmold 3, Housepit 1. The pieces could not be further identified.

SALICACEAE (Willow Family)

Populus L. (poplar, aspen)

Pit 1 associated with Dump Stratum II contained a small amount of charred poplar or aspen wood. The amount is too small to permit species identification. The closest source of the wood (P. tremuloides, quaking aspen) is in draws and moist ravines.

Salix L. (willow)

Fully charred willow wood was discovered in two samples from an earlier floor or occupation surface (F125) truncated by Housepit 1. Willow is common in draws near the site. Willow branches and twigs were used for a variety of construction purposes including such manufactures as fish-traps, weirs, basket hoops, hide-stretchers, rope, dip-net frames and sweathouse frames (Ray 1932:55, 68, 75, 82 and 92; Turner et al. 1980:136).

Poplar/Willow

Traces of willow or poplar charcoal were identified from Zone 15 and from the earlier floor or occupation surface truncated by Housepit 1. The amount was too small to identify further.

ULMACEAE (Elm Family)

Celtis douglasii Planch (hackberry)

One sample from Firepit 3 (F132) contained hackberry charcoal. The wood is not mentioned in regional ethnobotanies although the wood is suited for manufacturing.

OTHER TISSUE

The botanical assemblage also contains portions of four seeds which could not be identified from Zone 23 and two postmolds (PM 12, 14).

The leaf tissue listed in Table 5-1 is a fragment of ponderosa pine needle from Pit 1 (F112) debris associated with Dump Stratum II.

Finally, small bits of herbaceous tissue which could not be further identified were found in 19% of the samples (31% of the flotation samples).

SUMMARY BY ANALYTIC ZONES AND DISCUSSION

The botanical assemblage from 45-OK-250 is summarized below by analytic zone. Zones are discussed in from oldest to youngest.

ZONE 53

Samples were examined from two zones in the early Hudnut component (Zone 53). Zone 15 is occupation associated with basal alluvial materials below the housepits. Zone 24 is the correlative zone in the nonhousepit area. Zone 15 is represented by three flotation and seven carbon samples from more than 6.9 kg of sediment. The assemblage, which weighs 0.91 g, is shown in Table 5-1. Two assemblage flotation samples have an average carbon ratio of 0.2% and purity ratings of 80% and 90%. The flotation samples are from DU II sediments in units 2N26W and 4N30W and range in depth from 154 to 175 cm b.u.d. (below unit datum). All carbon samples are from DU II as well, units 2S28W and 2N32W, and were taken from UL 150 to 270. In addition, one flotation sample was examined from Stain 1, a region of orange-oxidized matrix within the overbank sands of DU II. The flotation sample contained ponderosa pine branch material, bark, and wood ash. The sample had a high purity rating of 80% and a low carbon ratio of 0.01%.

The entire assemblage consists of 98% conifer, 2% hardwood, and less than 1% other material. Most of the conifer is ponderosa pine branch and bole wood, followed by lodgepole pine, larch and Douglas fir. Some of each of these woods is incompletely carbonized. The most important hardwood is bitterbrush, and the only other hardwood present is either willow or poplar. Only one of the three flotation samples contained any herbaceous tissue and none of the samples held edible tissue.

In sum, Zone 15 botanical material is overwhelmingly conifer charcoal and semi-charred wood. Most of it is locally available ponderosa, but a surprising amount is lodgepole, a pine of higher elevations. Douglas fir and larch are about equal in aggregate weight and numbers of appearances. The fir is locally available, but larch like lodgepole pine, is a tree of higher elevations and moister environment. The most deeply buried, and presumably oldest, material is incompletely charred larch and lodgepole pine charcoal from UL 250 and 270 in 2S28W.

Three flotation samples from Zone 24 were examined from matrix associated with Firepit 1 in 12S36W. The assemblage consists of 0.08 g of archaeobotanical materials examined from 5.2 kg of sediment in UL 190 and 200. All three flotation samples contained bone, two had shell, and one contained fish bone, which may account for a rather low average purity rating of 36%. The average carbon ratio, 0.5% is moderately high for samples.

The assemblage contains 38% conifer charcoal, mostly pine, 50% hardwood, no edible material, and 13% other tissue by weight. The hardwoods--ocean spray, serviceberry and mock orange--are all important economic species. Two seed coat fragments were found in two samples, but could not be identified. The assemblage is different from Zone 15 and Zone 13. The number of samples however is small, and the difference may be an artifact of sample size.

ZONE 52

Zone 13 is represented by 26 flotation and 14 carbon samples, from two distinct cultural contexts Housepit 1 and associated features Dump Stratum II and associated features. Approximately 2.8 g of carbonized and partially carbonized botanical materials were examined from over 38.1 kg of sediments. About half the flotation samples were not weighed, so that carbon ratios could not be computed for them. Others were screened and used for radiocarbon samples. Radiocarbon dates extablish the contemporanity of Housepit 1 and Dump Stratum II, the botanical assemblage confirms their close association (Table 5-1 and Table 5-2).

Housepit 1

Over 1.8 g of botanical material were identified from the floor, postmolds, a possible earlier occupation, and exterior Firepit 2, and in the sedimentary matrix adjacent to Housepit 1. These will be discussed in greater detail below. The assemblage as a whole consists of 91% conifer, mostly pine, 7% hardwood, 1% edible material and 1% other herbaceous tissue by weight. Radiocarbon dates range in age from 2989±76 B.P. to 3453±97 B.P. A radiocarbon date of 4448±123 B.P. taken from partially carbonized ponderosa pine is probably too old for Feature 7, the housepit floor.

Most of the conifer is ponderosa pine, followed by lodgepole pine, yellow pine, Douglas fir and larch. Conifer bark was found in about 71% of the flotation samples, as was ponderosa pine. The bark's weight, though, is about one-fourth as much as the wood. All coniferous wood taxa have samples

Table 5-2. Botanical assemblage from Housepit 1 postmolds by weight (g) and numbers of appearances (#), 45-OK-250.

Assemblage	Feature Number																Total	
	102 (N=1) g	#	122 (N=3) g	#	123 (N=2) g	#	124 (N=2) g	#	116 (N=3) g	#	126 (N=1) g	#	130 (N=1) g	#	133 (N=1) g	#	(N=14) g	#
Conifer (94%)																		
Lodgepole pine	–	–	0.03	1	0.06	1	–	–	–	–	–	–	–	–	0.02	1	0.11	3
Ponderosa pine	0.03	1	0.03	2	0.08	2	0.05	2	0.12*	3	0.01	1	0.06	1	0.02	1	0.40	13
Yellow pine	0.03	1	0.01	1	–	–	–	–	–	–	–	–	–	–	–	–	0.04	4
Douglas fir	-0.01	1	-0.01	1	–	–	-0.01	1	–	–	–	–	–	–	–	–	-0.01	3
Larch	–	–	0.01[1]	1	–	–	0.02[1]	2	–	–	0.04[1]	1	–	–	–	–	0.07	4
Pinaceae	0.02[1]	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.02	1
Bark	-0.01	1	-0.01	2	-0.01	1	-0.01	1	0.02	3	–	–	0.01	1	0.03	1	0.06	10
Pitch	-0.01	1	–	–	-0.01	1	0.01	1	–	–	–	–	–	–	–	–	0.01	3
Hardwood (2%)																		
Bitterbrush	-0.01	1	–	–	–	–	–	–	–	–	–	–	–	–	-0.01	1	-0.01	2
Rosaceae	–	–	–	–	–	–	–	–	–	–	0.01	1	–	–	–	–	0.01	1
Bark	–	–	-0.01	1	–	–	–	–	–	–	–	–	–	–	–	–	-0.01	1
Other	–	–	–	–	–	–	–	–	-0.01	1	–	–	–	–	–	–	-0.01	1
Edible Material (2%)																		
Seeds	–	–	0.01	2	-0.01	2	–	–	–	–	–	–	–	–	-0.01	2	0.01	6
Root[2]	–	–	–	–	–	–	–	–	-0.01	1	–	–	–	–	–	–	-0.01	1
Other Tissue (2%)																		
Seeds	–	–	-0.01	1	–	–	-0.01	1	-0.01	1	-0.01	1	–	–	–	–	-0.01	4
Other	–	–	0.01	1	–	–	–	–	–	–	-0.01	1	–	–	–	–	0.01	2
Total	0.08		0.10		0.14		0.08		0.14		0.06		0.07		0.07		0.74	

[1] Samples with incompletely carbonized wood.
[2] Some of the edible root material is camas (*Camassia* sp.).

containing incompletely charred wood. Fully charred pitch and cone material also are present in small amounts in a few flotation samples and carbon samples. Cedar bark was found in a single flotation sample, but potentially valuable wood was not identified from any 45-OK-250 samples.

Hardwoods rarely were found in flotation samples and carbon samples from Housepit 1. Those identified were bitterbrush, serviceberry, mock orange, poplar/willow, willow, birch and rosaceous shrub charcoal. Sage is conspicuous by its absence at the site, and even bitterbrush is not very common. Both woods have figured prominently in other sites in the project area, although sage usually appears as a wood in components younger than 3,000 years. Bitterbrush, however, has been found in relative abundance in Hudnut and Kartar Phase flotation samples elsewhere, and its relative absence in Housepit 1 is unusual.

If hardwoods are rather rare in the samples, edible material from the Housepit 1 floor, postmolds and the matrix adjacent to the floor, is plentiful. The Housepit 1 assemblage consists of five western goosefoot seeds, a hawthorn seed fragment, two serviceberry seeds, three smaller goosefoot seeds, 1 camas root fragment, three samples of starchy root (Lomatium ?) and 2 samples of charred fruit tissue. These are the sorts of foodstuffs one would expect from a winter occupation.

Matrix adjacent to the structure (F73) had similar edible material--a western goosefoot seed, starchy root and fruity tissue.

Other material in the samples include a trace of grass from one flotation sample and a small amount of herbaceous material from Housepit 1 flotation samples.

Housepit 1 Postmolds

Table 5-2 shows the botanical assemblage of eight postulated postmolds from Housepit 1. Over 0.74 g of charred and semi-charred material was identified from 14 flotation sample samples taken from 21.5 kg of sediment. The assemblage consists of 94% conifer, 2% hardwood, 2% edible material and 2% other tissue by weight. The soil in the postmolds had an average carbon ratio of 0.3% and average purity rating of 65%. All samples had been screened through 3.2 mm (1/8 inch) mesh to remove carbon for dating. This treatment diminished the integrity of the samples and, as a consequence, our knowledge of the post mold contents.

The post molds ranged in size from 20 to 40 cm in diameter, and extended below the floor approximately 10 to 25 cm (Table 6-6). Most were parallel-sided and vertical with respect to the plane of the floor. Two (4 and 11) contained large amounts of a single wood (ponderosa pine) which might have been the basal portion of burned structural members. All the post molds had material other than wood, and six contained assemblages suggesting secondary fill--two or more kinds of wood plus an array of botanical and non-botanical cultural material. All had bone fragments, some of which were burnt, 63% contained shell, and 50% contained fire-modified rock. Half of the features also contained edible botanical material, and two contained reddish or orange pigment lumps. One mold had a few small lithic flakes and one contained fish bone. Postmold 3 contained many (N=12) charred rodent scats suggesting burning after abandonment or post removal. Three molds in the northwest portion of the structure (PM 12, 13 and 14) were found with orange-stained soil surrounding portions of the periphery--also suggesting fire.

The varied edible remains are in good condition. They consist of a serviceberry seed and portion of a western goosefoot achene in Postmold 14; a western goosefoot achene and the seed of a smaller species in Postmold 14, and a serviceberry seed and small goosefoot seed in Postmold 1. Postmold 4 contained camas root tissue and remains of a starchy root, probably lomatium tissue. Two probable bitterbrush seed fragments were also found in Postmolds 3 and 4, and two unidentified seed parts were extracted from Postmolds 14 and 12.

In short, the imputed molds were an excellent repository for a variety of botanical materials that suggest a domestic midden.

Other Samples

Samples were examined from two localized scatters associated with Housepit 1. Feature 125, an earlier occupation truncated by Housepit 1 in Unit 6N32W (Figure 6-7), is a vaguely bounded region containing bone, charcoal, and tabular quartzite tools. The feature is represented by one flotation sample and four carbon samples, and has a radiocarbon date of 3453±97. The flotation sample had a carbon content of 0.04%.

This assemblage differs from the general array of housepit floor material and postmold charcoal in its large hardwood content. The assemblage consists of 70% conifer and 30% hardwood with a trace of grass and herbaceous tissue. The conifers consist mostly of charred and semi-charred ponderosa pine, lodgepole pine, yellow pine and semi-charred Douglas fir. Each of these woods weighs about the same (0.06-.07 g) and appears in nearly every sample. In addition, there is a trace of bark and pitch. The hardwoods consist of a large amount of willow (0.08 g), some birch (0.04 g), and traces of poplar/willow and serviceberry. Although willow, birch and serviceberry can be used as fuel, they are more useful as construction materials. No edible plant materials were found in the samples.

Exterior Firepit 2 (F96) is a few meters east of the Housepit 1 periphery in 2N22W (Figure 6-3). With a date of 3194±153 it may represent an activity area associated with the structure. Field notes describe the area as one of burnt soil strewn with bone and shell. It is represented by one flotation sample consisting of 0.01 g of pinaceae charcoal with traces of serviceberry wood and herbaceous tissue.

The sediment in which the Housepit depression was excavated is Feature 73. This matrix is represented by two flotation samples taken in UL 120 and 200. The small, 0.10 g, assemblage was extracted from 4.4 kg of soil. The samples had an average carbon ration of 0.03% and a purity rating of under 60%. The botanical array contains small amounts of semi-charred yellow pine and ponderosa pine, a small amount of pine bark, trace of cedar bark, and a and ponderosa pine, a small amount of pine bark, trace of cedar bark, and a portion of a male pine cone. Serviceberry is the only hardwood present. The edible category is large (0.01 g) and is represented by one western goosefoot seed, a trace of starchy root, probably lomatium tissue, and some charred tissue which resembles that from a fleshy fruit. The array resembles that from Housepit 1 except for cedar bark.

Dump Stratum II

Approximately 0.90 g of botanical material was identified from Dump Stratum II, south of Housepit 1, and associated features. Six samples were examined from a Pit 1 (F112); one was taken from Firepit 3 (F132); and three were from Zone 14 matrix (F115) below the dump stratum.

In addition, a small piece of rolled birch bark was identified from a miscellaneous carbon sample (M#1918) from Pit 1. Carbon extracted from the hearth, and the main layer within Dump Stratum II (F95) were radiocarbon dated to 3143±85 B.P. and 3323±105. Thus the dumping activity is contemporaneous with Housepit 1.

Only two of five flotation samples were weighed, for a total of 1.9 kg. These had carbon ratios of 0.5% and 1.4%. The latter value is the highest from 45-OK-250. Purity ratings, at 90% and 99%, were also high.

The entire assemblage of 14 samples consisted of 51% conifer, 42% hardwood, and 1% edible material by weight. A section of ponderosa pine needle is the only other tissue present.

The most common wood by weight and number of appearances is bitterbrush, found in 45% of the samples. In fact, the dump samples contain 93% of the bitterbrush charcoal in the entire site assemblage. Firepit 3 contains bitterbrush and little else except a trace of hackberry. Fully 0.20 of the 0.27 g of bitterbrush are from the hearth and Pit 1.

Douglas fir is the second most important wood by weight, and third, behind ponderosa pine, in number of appearances. Present in quantity, conifer bark is found more often than lodgepole pine charcoal. Hemlock appears for the first time at the site. Some of this hemlock, as well as Douglas fir and yellow pine, is incompletely charred. The assemblage also contains traces of poplar or aspen, hackberry, and birch charcoal.

Edible material is found in the pit feature and in Zone 14 matrix below Dump Stratum II. It consists of a small charred goosefoot seed, portions, of a hawthorn seed and portions of common sunflower seed from the pit; as well as a broken cherry pit, and bits of hawthorn seed from the matrix.

The edible array is similar to that from Housepit 1 postmolds; while the wood percentages, condition and most of the taxa are similar to those examined from the floor of Housepit 1.

6. FEATURE ANALYSIS

Over 40 cultural features were recorded at 45-OK-250, and over 30 at 45-OK-4. These features have been distilled from the more than 180 feature numbers which were assigned to a variety of cultural and non-cultural phenomena during excavation. During laboratory analysis, each of these field-designated features was subjected to a two-stage paradigmatic classification. The first step considered feature boundaries, shape, provenience and patterning, and the second the material contents. Following this classification, field designations were combined or disregarded, as appropriate. The cultural features which remain for further discussion are then further classified according to functional type. These types include housepits, firepits, other pits, debris concentrations, occupation surfaces, stains, and cultural strata. Methods and procedures are described in detail the project's research design (Campbell 1984d).

Chapter 2 discussed the analytical zones of each site, as well as the encompassing Zones 51, 52 and 53, which allow comparisons between the two sites to be made (see Figure 2-16). The discussion of features at each site is organized in temporal order under these larger zonal divisions.

45-OK-250 FEATURES

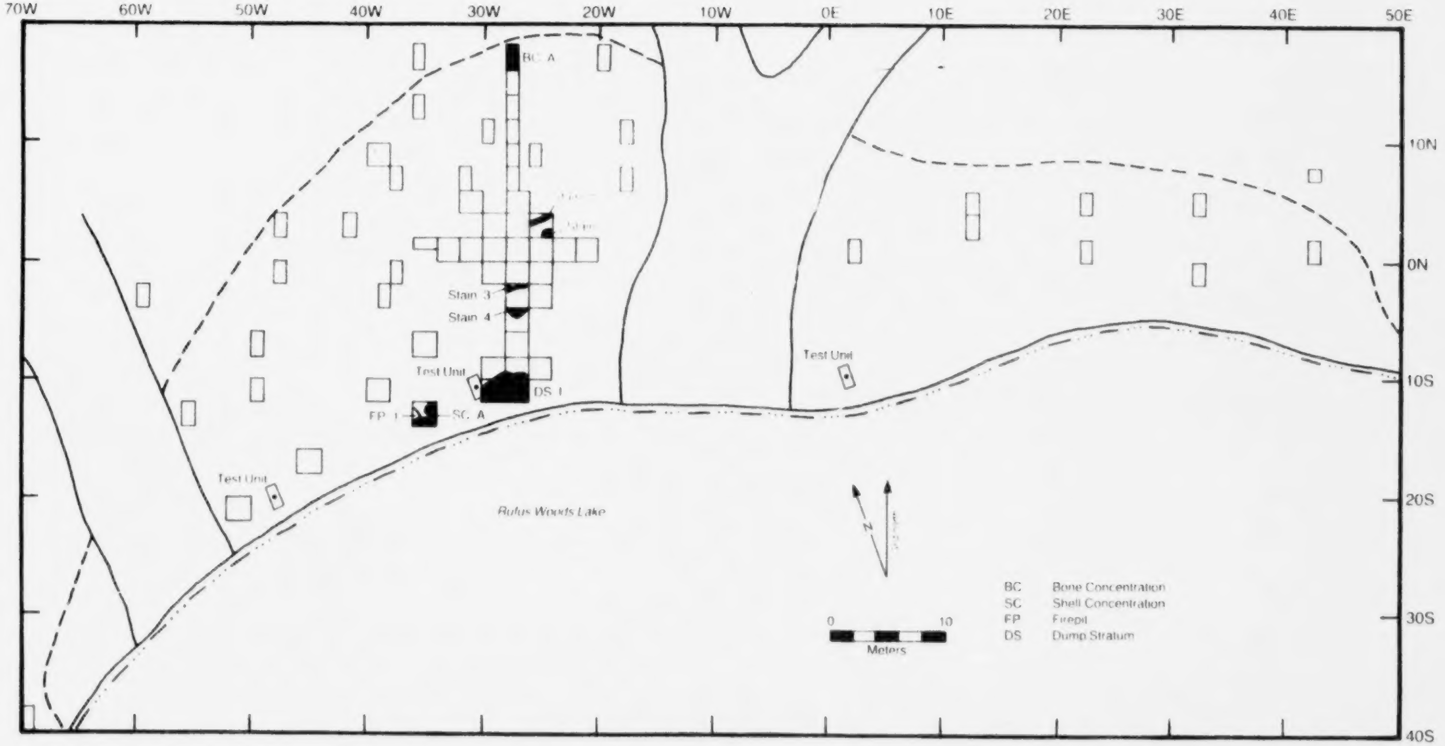
Features were found in all three zones at 45-OK-250 (Table 6-1). The features at 45-OK-250 include a feature type that is either unique to the site or results from the especially conscientious excavation. That is, we were able to distinguish large midden deposits, in which evidence of *in situ* activity also was present, and one occupation surface where there is evidence of trash disposal as well. Because of this dual function, we have combined both midden and exterior activity surfaces into a single designation, "Surface," while noting the primary function of that "Surface" in both text and tables (e.g., [Midden] Surface 2). At other sites analyzed by the project, more limited midden deposits have been classified as debris scatters, characterized by the primary constituent, such as shell concentration. The absence of distinct trash disposal or midden areas at other sites may by due to different excavation procedures.

ZONE 53

Zone 53 contains the oldest cultural features at 45-OK-250. Most were exposed within the main excavation area, beneath Housepit 1 and Housepit 2, and within the dump (Figure 6-1).

Table 6-1. Correlation of features and field designations by zone, 45-OK-250.

Summary Zone	Analytic Zone	Feature Number	Feature Description
53	15	81	Bone Concentration A
		103	Stain 1
		107	Stain 2
		128	Stain 3
		120	Stain 4
		111	Dump Stratum I
	24	91	Shell Concentration A
		87	Firepit 1
52	13	7,129	Housepit 1
		56,102,116,121, 122,123,124,126, 130,133,134,135, 138	Interior pits/postmolds
		73,78,125	Earlier floor(s)
		96	Firepit 2
		12,70,113	Housepit 2
		47	(Midden) Surface 2
		11,68,95,131	Dump Stratum II
		132	Firepit 3
		112	Pit 1
52	14	127	Bone Concentration B
	22	2	Shell Concentration C
		77	Shell Concentration D
		54	(Midden) Surface 3
		20	(Occupation) Surface 4
		1	FMR Concentration A
		26	Shell Concentration E
		16	Pit 2
	23	28,82	(Occupation) Surface 1
		13	Bone Concentration C
		23	Shell Concentration B
51	11	101	Shell concentration F
	12	136	Pit 3
		114	Dump Stratum III
		92	Dump Stratum IV
		106	FMR Cluster B
		94	FMR Cluster C
		29	(Midden) Surface 5
		8	(Occupation) Surface 6
		108	FMR Cluster D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60W
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10E
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30E
40E
50E
10N
0N
10S
20S
30S
40S
BC A
Stain 3
Stain 4
Test Unit
DS 1
FP 1
SC A
Test Unit
Test Unit
Rufus Woods Lake
N
0
10
Meters
BC Bone Concentration
SC Shell Concentration
FP Firepit
DS Dump Stratum

Figure 6-1. Location of features, Zone 53, 45-OK-250.

Basic descriptive data for the features of Zone 53 can be found in Tables 6-2 through 6-4. Provenience, dimensions and total material contents, as well as an estimate of the volume excavated can be found in Table 6-2. Table 6-3 details the provenience of stone, bone and shell artifacts, and Table 6-4, of identified bone fragments. The last two tables are sitewide, and not confined to the features of Zone 53.

The features of Zone 53, which date prior to 3800 B.P., consist of shell and bone concentrations on the contact between sands and silts of DU II and DU III and on the basal deposits of DU I. Several isolated cultural stains below the floor of Housepit 1 within DU II indicate at least sporadic use of earlier surfaces. These stains do not seem to be associated with two other postulated living surfaces which preceded Housepit 1, the evidence of which is found just outside the south and northwest rim of the housepit (see Housepit 1 discussion, below).

Beginning at the northern end of the trench excavation, a bone concentration (F81) was uncovered below Housepit 2. Covering a 1 x 3 x .30-m area, it consisted of large fragments of deer and mountain sheep bone. Some show signs of butchering. Among the deer bone, leg, foot, jaws, and teeth were identified, but no ribs or other bones from the body. Apparently the limbs and head were transported from the kill site for further processing. Only leg and toe bones were identified for the mountain sheep, suggesting the same sequence of events.

The next set of features occur below Housepit 1 (F103, 107, 120, 128). These are all small areas of burned or oxidized, orange sand or charcoal staining within the DU II sand matrix. They range from 10-25 cm in thickness and contain a variety of cultural material. Unconnected to the housepit occupation above, they seem to represent earlier occupations.

The major feature in Zone 15 is Dump Stratum I (F111), a thick shell layer. This is the earliest of midden layers and is separated from the younger Dump Stratum II by 40-50 cm of matrix with low cultural material content (see Figure 6-6). Nearly 9,500 shell hinge pieces were collected (Table 6-2), as well as bone, debitage, a utilized flake and an anvil stone. The layer ranged from 7 to 15 cm thick, and was thickest at the bottom of the slope; a thin lens of dark stained soil underlined the shell layer.

A possible firepit, not recorded as a separate feature, occurs west of the dump area. It consists of 11 FMR clustered in a 30 x 30 cm area with additional FMR nearby (Figure 6-2). Fish vertebrae and mammal bone were found among and below the FMR. Associated charcoal flecking and staining support interpretation as a firepit. Since Firepit 1 was not excavated separately, no material counts for it appear in the tables.

A 20-cm thick shell layer (F91) lies above the firepit. Shell is by far the largest material class represented. Over 1,700 hinge pieces were collected (Table 6-2). The shell was in large pieces, very densely packed and surrounded by darkly stained matrix from decomposition.

Table 6-2. Dimensions, provenience, and contents of features, Zone 53, 45-OK-250.

Feature	Provenience	Dimensions	Estimated Excavated Vol. (m^3)	Lithic Debitage	Tools		Bone		Shell		FMR	
					Stone	Bone	#	wt (g)	#	wt (g)	#	wt (g)
Analytic Zone 15												
Bone Concentration A	**16N28W,18N28W**	1x3x.30 cm	0.625	17	2	-	1,607	1,484	7	16	6	870
Stain 1 (orange)	**4N26W**	Irregular; 15 cm thick	0.061	1	-	-	5	-	-	-	1	142
Stain 2 (orange)	**4N26W**	80x90x15 cm	0.150	1	-	-	19	1	4	14	-	-
Stain 3 (orange)	**2S28W**	200x50x25 cm	0.300	-	-	-	2	3	5	-	-	-
Stain 4 (carbon)	**4S28W**	80x25x10 cm	0.020	-	1	-	7	3	48	-	-	-
Dump Stratum I	**8S-10S;28W-30W**	4x4 m;7-15 cm thick	1.125	19	2	-	113	16	9,409	-	24	4,025
Analytic Zone 24												
Shell Concentration A	**12S36W**	Irregular; 20 cm thick	0.333	4	-	-	49	13	1,705	-	10	1,082

Table 6-3. Worn and manufactured stone, bone and shell artifacts from cultural features, 45-OK-250.

Feature	Stone																								Shell	Bone											
	Utilization only	Unifacially retouched flake	Bifacially retouched flake	Resharpening flake	Biface	Projectile point	Projectile point base	Projectile point tip	Blade	Microblade	Drill	Graver	Scraper	Core	Tabular knife	Hammerstone	Pestle/Maul	Edge ground cobble	Chopper	Millingstone	Anvil	Stone bead	Shaped/incised siltstone	Indeterminate	Dentalium	Awl	Wedge	Pendant	Harpoon point	Pointed fragment	Blunted end	Flaked long bone shaft	Other formed bone fragment	Technologically modified only	Utilized fragment	Indeterminate	Bone bead
Zone 53																																					
Bone Concentration A	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stain 4	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dump Stratum I	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zone 52																																					
(Occupation) Surface 1	3	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Housepit 1																																					
Floor	27	12	9	6	10	9	1	5	-	-	2	1	1	1	37	5	2	-	3	7	-	3	2	-	-	-	-	1	1	3	1	13	14	3	4	2	-
Pit 16	18	2	4	-	-	-	-	1	-	-	1	1	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Earlier occupation (F73,78)	2	-	-	1	2	3	1	1	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
Earlier occupation (F125)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Fill	4	3	1	1	1	1	1	-	-	-	-	1	1	-	4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Housepit 2	9	6	1	3	3	1	-	-	-	-	-	-	1	1	-	3	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	1	1	-	-	-	-
(Midden) Surface 2	1	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dump Stratum II (F68, 95)	24	9	8	1	12	9	-	1	-	2	1	-	1	1	28	1	-	-	1	2	-	2	4	-	3	-	-	-	-	1	-	1	1	6	3	-	-
Feature 11	8	1	2	1	3	2	1	-	-	-	1	-	1	-	11	3	-	-	-	1	-	1	1	-	-	-	2	-	-	1	-	3	-	1	1	-	1
Shell Concentration C	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Midden Surface 3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
(Occupation) Surface 4	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shell Concentration E	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pit 2	1	-	1	-	1	1	1	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zone 51																																					
Pit 3	1	1	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dump Stratum III	5	1	2	3	-	2	-	1	-	-	-	-	-	-	11	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dump Stratum IV	10	5	5	-	3	-	2	1	1	-	-	-	1	-	1	12	2	-	-	-	-	-	-	4	-	2	-	-	-	1	-	-	-	-	-	-	-
(Midden) Surface 5	2	1	-	-	-	-	1	-	-	-	-	-	-	-	4	2	1	1	-	2	1	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	1
(Occupation) Surface 6	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FMR Cluster D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shell Concentration F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6-4. Identified bone fragments from cultural features, 45-OK-250.

Feature	Taxa																	
	Deer	Deer-sized	Elk	Elk-sized	Mountain sheep	Sheep/antelope	Cervidae, unknown	Salmonidae	Cyprinidae	*Canis* sp.	Cricetidae, unknown	Deer mouse	Pocket gopher	Pocket mouse	Marmot	Ground squirrel	Painted turtle	Other
Zone 53																		
Bone Concentration A	59	30	–	–	17	–	–	–	–	–	–	–	–	–	–	–	–	–
Dump Stratum I	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Shell Concentration A	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Zone 52																		
Bone Concentration B	4	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(Occupation) Surface 1	1	2	–	–	–	–	–	–	2	–	–	1	–	–	–	–	–	–
Bone Concentration C	–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–
Housepit 1																		
Floor	119	190	–	–	1	6	–	15	3	2	2	–	–	2	1	1	19	1[1]
Interior Postmolds	10	2	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–
Early Floor I (F73, 78)	8	45	–	–	1	–	2	–	–	–	–	–	–	2	–	–	4	–
Fill	12	11	–	–	1	–	–	2	–	–	–	–	1	–	1	–	2	–
Housepit 2	22	46	–	–	–	–	–	3	–	–	–	14	2	2	–	–	1	–
(Midden) Surface 2	3	6	–	–	–	–	–	–	1	6	–	–	2	–	–	–	1	–
Dump Stratum II (F88, 95)	81	187	–	–	1	–	1	4	1	2	–	–	1	1	1	–	27	–
Feature 11	125	99	1	1	–	1	–	1	–	–	–	–	–	–	1	–	53	–
(Midden) Surface 3	8	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
(Occupation) Surface 4	4	2	–	–	1	–	–	24	–	–	–	–	–	–	–	–	1	–
Pit 2	3	5	–	–	–	–	–	2	–	–	–	–	–	–	–	–	4	–
Zone 51																		
Pit 3	5	8	–	–	–	–	–	1	–	–	–	–	–	–	–	–	2	–
Dump Stratum III	15	19	–	1	–	1	–	–	–	–	–	1	7	1	–	–	1	–
Dump Stratum IV	18	25	–	–	5	2	–	2	–	–	2	–	2	4	–	–	18	–
FMR Cluster B	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1	–
(Midden) Surface 5	–	3	–	–	–	–	–	1	–	14	–	–	–	1	–	–	1	–
(Occupation) Surface 6	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

[1] Rattlesnake

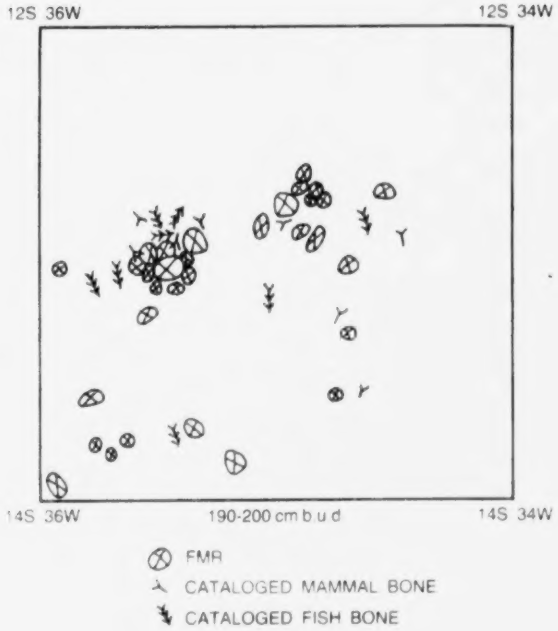


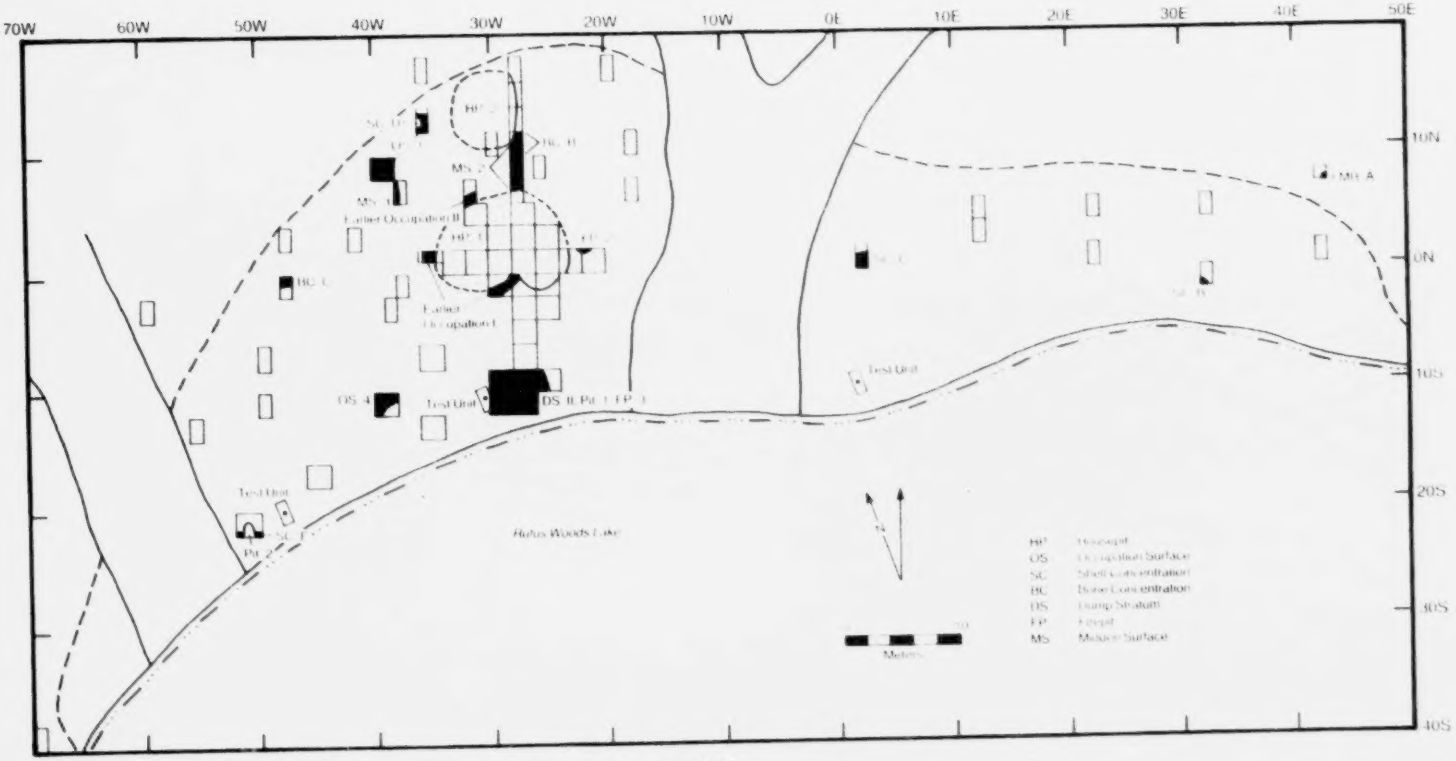
Figure 6-2. Plan view of Firepit 1, Zone 53, 45-OK-250.

ZONE 52

Zone 52, at 45-OK-250, consists of two components. The first (Zones 14 and 23) underlies and surrounds the housepit occupation. The second (Zone 13) includes the housepits and contemporary exterior occupation surfaces, midden and debris concentrations. Figure 6-3 shows the location of all features in Zone 52; Figures 6-4, 6-5, and 6-6 show features from the trench excavation in profile. Provenience, contents and other descriptive information are summarized in Table 6-5, specifics are recorded in Tables 6-3 and 6-4.

Bone Concentration B (F127), exposed in the north end of the trench. It is a cluster of large FMR (mean weight 283 g) and very large bone (mean weight 4.2 g). The bones were part of deer pelvic and leg bone, suggesting transport from the kill site to this location for further processing. FMR were concentrated toward the west side of the unit, possibly representing an eroded firepit associated with the butchering activity area.

Occupation Surface 1 was exposed in 10N40W (F28) and 14N36W (F82). It may be more properly called an occupation stratum, for Feature 28 was a 40 cm thick deposit of charcoal staining and burned soil; its boundaries shifted constantly from excavation level to level, suggesting an accumulation of localized activities and fires. Feature 28 is small and thin, and seems to represent one brief occupation. The date of 3349±80 B.P. from Feature 28 is very similar to that taken from an occupation truncated by Housepit 1.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60W
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40W
30W
20W
10W
0E
10E
20E
30E
40E
50E
10N
0N
10S
20S
30S
40S
SC FP
FP
HP 2
BC B
MS 2
MS 1
Earlier Occupation II
HP 1
FP
BC C
Earlier Occupation I
OS 4
Test Unit
DS II Pit 1 FP 1
Test Unit
SC F
Pit 2
Rufus Woods Lake
SC C
SC B
MH A
Test Unit
N
HP Housepit
OS Occupation Surface
SC Shell Concentration
BC Bone Concentration
DS Dump Stratum
FP Firepit
MS Midden Surface
10
Meters

Figure 6-3. Location of features, Zone 52, 45-OK-250.

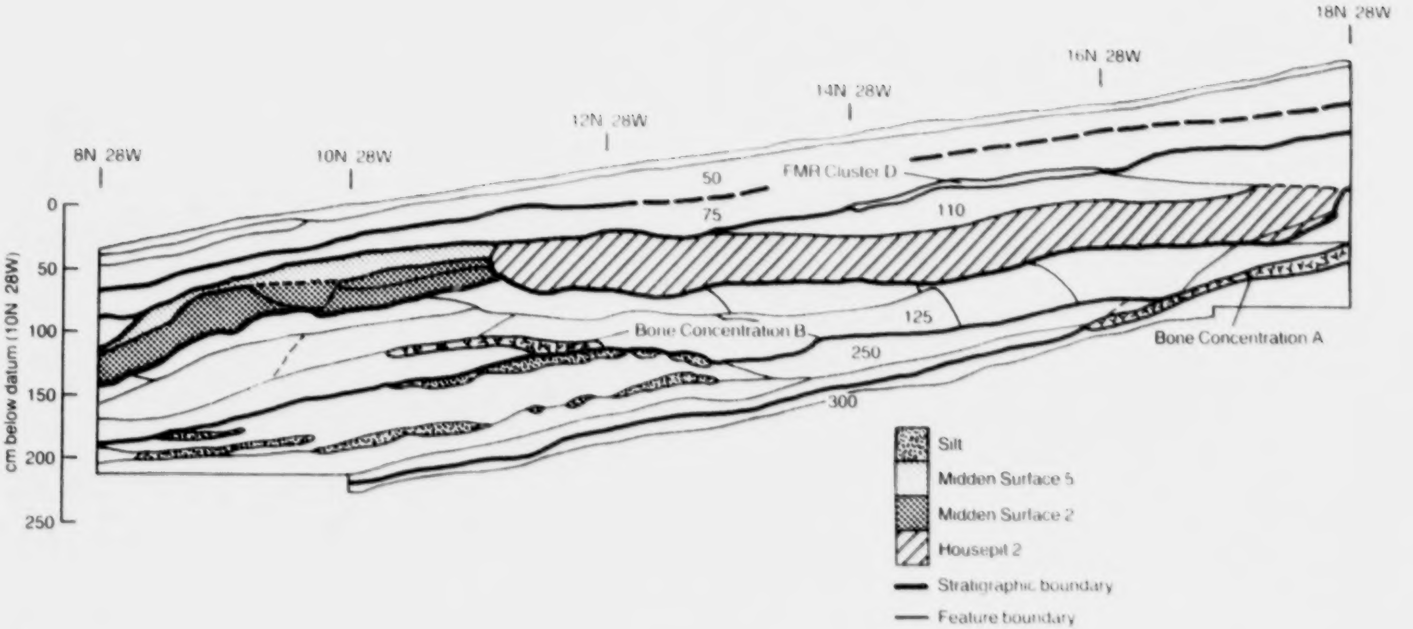

18N 28W
16N 28W
14N 28W
12N 28W
10N 28W
8N 28W
cm below datum (10N 28W)
0
50
100
150
200
250
50
75
FMR Cluster D
110
125
250
300
Bone Concentration B
Bone Concentration A
Silt
Midden Surface 5
Midden Surface 2
Housepit 2
Stratigraphic boundary
Feature boundary

Figure 6-4. Stratigraphic profile of 28W trench, 18N to 8N, 45-OK-250.

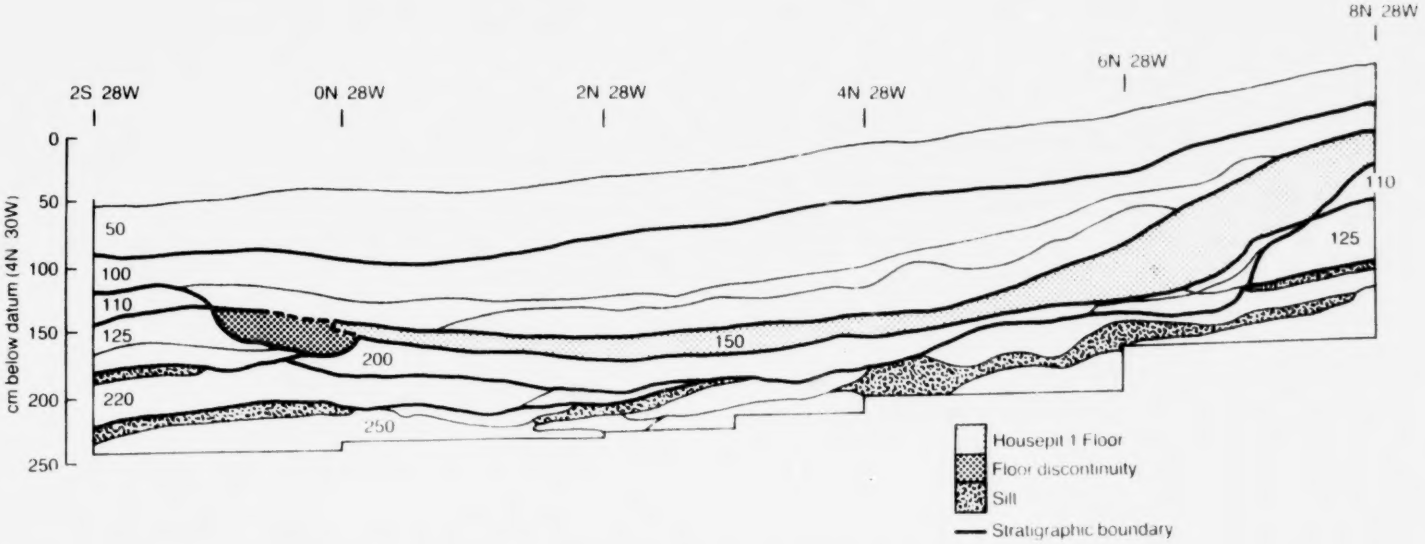

2S 28W
0N 28W
2N 28W
4N 28W
6N 28W
8N 28W
cm below datum (4N 30W)
0
50
100
150
200
250
50
100
110
125
200
220
250
150
110
125
Housepit 1 Floor
Floor discontinuity
Silt
Stratigraphic boundary

Figure 6-5. Stratigraphic profile of 28W trench, 8N to 2S, 45-OK-250.

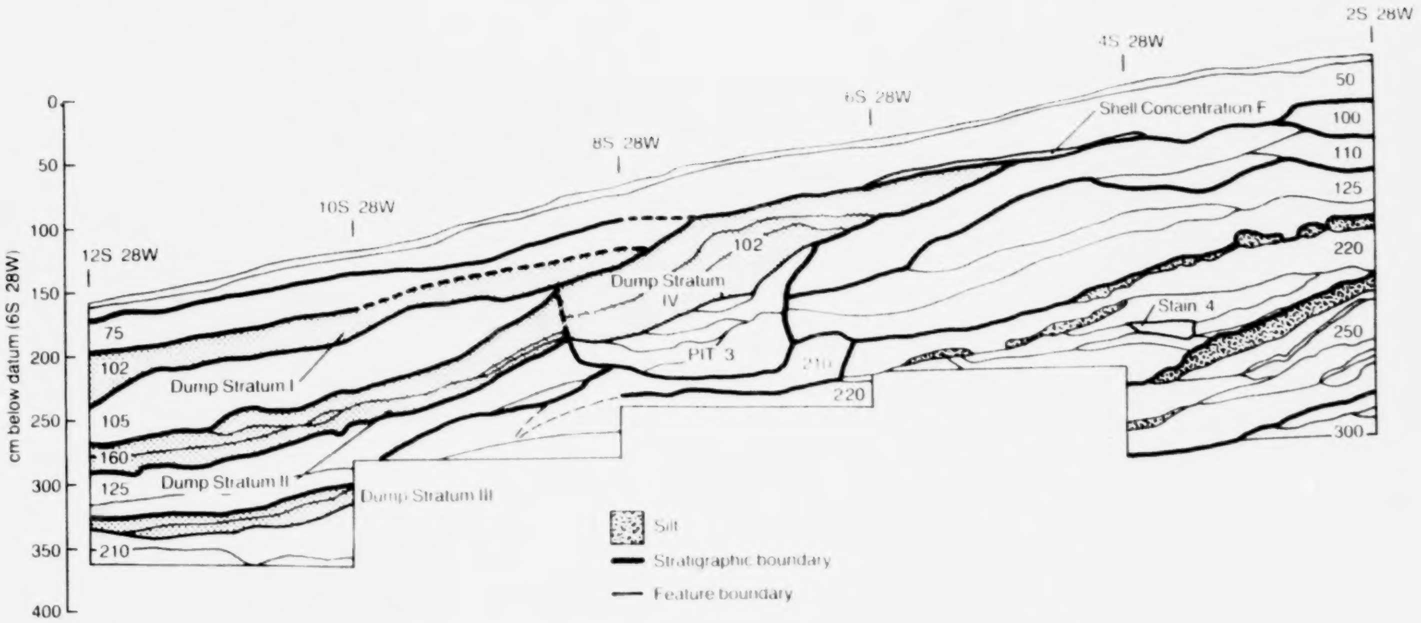

12S 28W
10S 28W
8S 28W
6S 28W
4S 28W
2S 28W
0
50
100
150
200
250
300
350
400
cm below datum (6S 28W)
75
102
105
160
125
210
Dump Stratum I
Dump Stratum II
Dump Stratum III
Dump Stratum IV
102
PIT 3
210
220
Shell Concentration F
50
100
110
125
220
Stain 4
250
300
Silt
Stratigraphic boundary
Feature boundary

Figure 6-6. Stratigraphic profile of 28W trench, 2S to 12S, 45-OK-250.

Table 6-5. Dimensions, provenience and contents of features, Zone 52, 45-OK-250.

Feature	Provenience	Dimensions	Estimated Excavated Vol. (m^3)	Lithic Debitage	Tools		Bone		Shell		FMR	
					Stone	Bone	#	wt (g)	#	wt (g)	#	wt (g)
Analytic Zone 14												
Bone Concentration B	12N28W	1x2x0.2 m	0.400	-	-	-	29	122	-	-	14	3,970
Analytic Zone 23												
(Occupation) Surface 1	10N40W, 14N36W	Irregular; up to 40 cm thick	-0.961	51	7	-	757	143	1	9	22	23,205
Bone Concentration C	0N48W	1x1x0.10 m	0.100	2	-	-	67	20	-	-	-	-
Shell Concentration B	0N32E	70x85x5 cm	0.030	-			-		382	2,122	-	-
Analytic Zone 13[1]												
Housepit 1	0N-8N;24W-34W	11x8 m; 90 cm deep	11.000	2,140	143	42	35,906	7,997	1,503	-	765	106,299
Earlier occupation I	0N26-30W	1x4x0.15 m	2.100	254	13	2	3,271	1,021	317		33	3,899
Earlier occupation II	6N32W	Irregular; 15 cm thick	0.167	5	-	1	66	17	1	1	-	-
Fill	0N-6N;24W-34W	-	11.335	487	22	2	5,353	827	134	85	24	2,659
Firepit 2	2N22W	100x50x15 cm	0.100	2		-	21	3	8	19	10	8,033
Housepit 2	12N30W;12-16N28W	Unknown; 40 cm deep?	3.033	351	29	3	3,144	1,389	1,134	2,250	261	45,315
(Midden) Surface 2	8N-12N;26W-28W	Irregular; 7-30 cm thick	0.817	46	5	-	2,945	624	6,025	1,006	186	23,264
Dump Stratum II (F68, 85)	8S-10S;26W-30W	Irregular; 10-25 cm thick	4.400	1,605	107	15	49,849	10,042	6,335	-	1,056	109,247
Feature 11	8S26-30W	Irregular; 5-15 cm thick	2.592	316	37	9	22,588	5,529	16,912	-	604	166,978
Pit 1	10S28W	30 cm diameter, 27 cm deep	0.019	1	-	-	20	2	1	-	9	5,095
Firepit 3	8S28W	70x60x13 cm	0.040	13	-	-	46	8	7	-	14	4,680
Analytic Zone 22												
Shell Concentration C	2N2E	1x1x0.15 m	0.150	1	2	-	3	-	328	822	17	3,110
Shell Concentration D	14N36W	50x40x20 cm	0.050	-	-	-	11	2	50	195	-	-
(Midden) Surface 3	8N38W	200x50x25 cm	0.250	20	2	2	144	59	497	1,763	15	3,030
(Occupation) Surface 4	10S40W	100x200 cm; 15-20 cm thick	0.750	21	4	-	840	117	2	142	37	66,850
FMR Cluster A	8N42E	30x30x20 cm	0.100	2	-	-	-	-	3	3	10	11,150
Shell Concentration E	20S52W	150x50 cm; 10 cm thick	0.183	2	2	-	44	10	583	2,098	3	460
Pit 2	20S52W	170x75x30 cm	0.500	8	8	-	181	183	4,030	13,524	8	8,154

[1] For Housepit 1 interior pits and postmolds see Table 6-6.

Bone Concentration C (F13) consists of the bone contained within a single 1 x 1-m excavation level. Only three mountain sheep fragments were identified; two are articulated horn core fragments. Given the lack of other evidence, we cannot say whether this is an in situ butchering area, or secondary trash disposal.

A shell concentration (F23) on the far east side of the site is assigned to this zone. Only a small area of the entire concentration was exposed in the SW corner of the unit. In density of shell, it is very like the shell layers of Dump Strata I and II, but unlike them, contains no other material.

Housepit 1

Radiocarbon dates: 4448±123 (B-4337): association questionable
3453±97 (B-4342): association with early floor?
3219±95 (B-4341): good association with floor
2989±76 (B-4336): from postmold 10

Floor Area: 11 x 8 m
Rim Area: 11 x 9 m ?
Depth: 50 cm on south (downslope) side

Housepit 1 at 45-OK-250 has three unique, possibly related attributes: its floor has an unusual shape in plan view, the living surface does not extend out to the walls, and there is a discontinuity in the floor on the south side. In plan view, the floor of Housepit 1 is heart-shaped (Figure 6-7). In profile, its walls are very steep and the bottom of the excavation well-defined (Figure 6-5); however, the actual occupation area does not seem to come near the wall on the west and east sides. The main floor deposits begin about one meter in from the wall itself, and there is little evidence of an occupation which fills in the gap; that is, there is little evidence that the excavation of the straight-walled pit structure preceded the occupation which we are about to describe: they appear to be the same.

The discontinuity in the floor on the south side is 50 cm wide and can be seen in profile as a bump, or rise in the underlying matrix (Figures 6-5 and 6-8). The floor above this bump has been truncated, apparently by prehistoric activity. Disturbed soil was recorded above and below the discontinuity, but what disturbed the floor or when is unknown. There was no evidence of a pit during excavation nor does it seem that the discontinuity represents an entryway with no accumulation of floor matrix because of use. It seems to represent an earlier occupation (F73, 78) almost completely destroyed by Housepit 1. We cannot state whether this surface was inside or outside the house. An aberrant radiocarbon date of 4448±123 B.P., taken from the Housepit 1 floor (F7) just above its contact with the lower surface suggests that a structure had been present earlier. Profiles and excavation records show other truncated surfaces just outside the housepit in 1S27W-30W within Stratum 125 and 0N32W to 34W at the contact between strata 110 and 125 (Figure 6-8). Another, earlier occupation (F125) was truncated by the northwest rim of

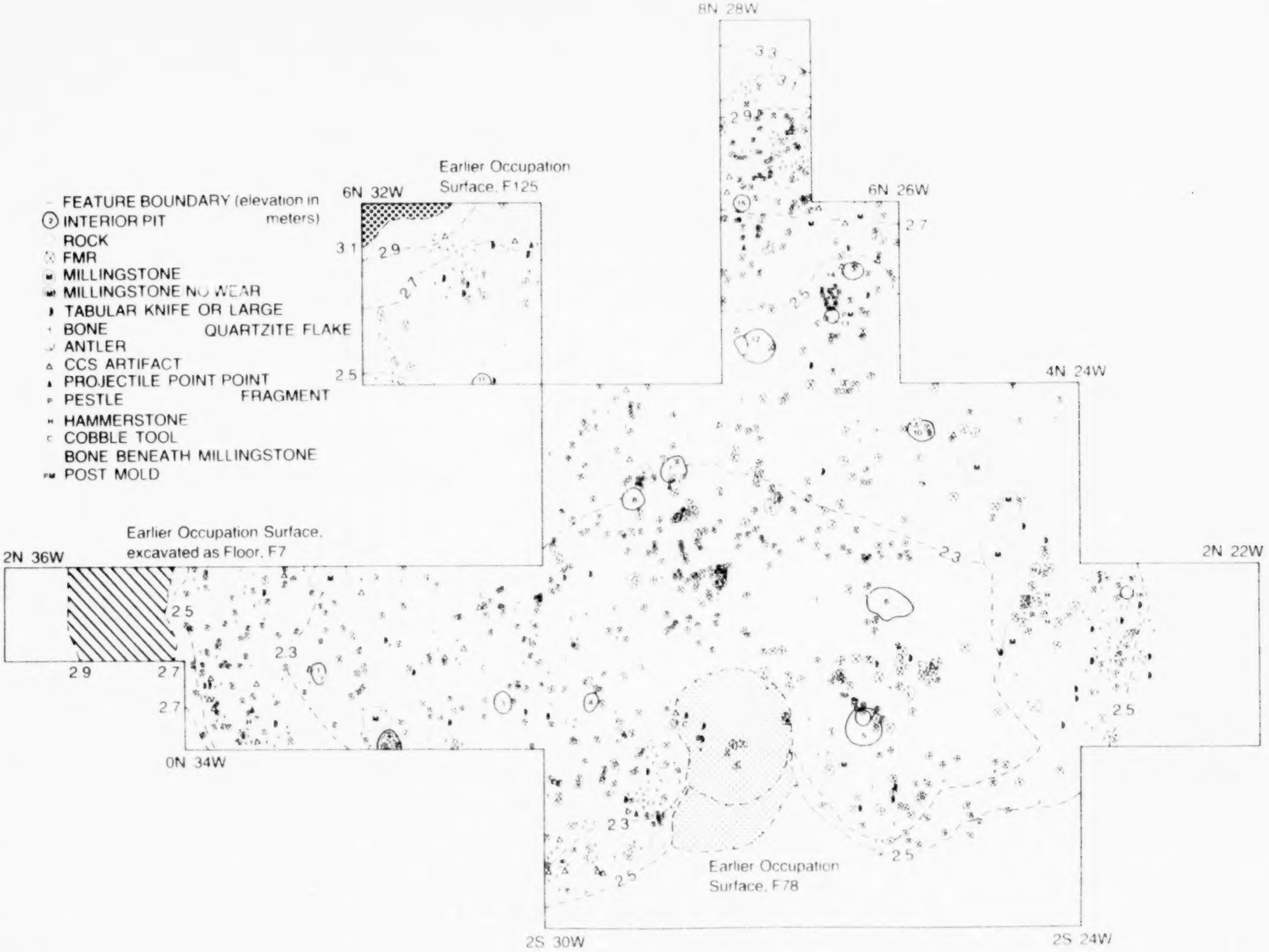

FEATURE BOUNDARY (elevation in meters)
INTERIOR PIT
ROCK
FMR
MILLINGSTONE
MILLINGSTONE NO WEAR
TABULAR KNIFE OR LARGE QUARTZITE FLAKE
BONE
ANTLER
CCS ARTIFACT
PROJECTILE POINT POINT FRAGMENT
PESTLE
HAMMERSTONE
COBBLE TOOL
BONE BENEATH MILLINGSTONE
POST MOLD
Earlier Occupation Surface, excavated as Floor, F7
Earlier Occupation Surface, F125
Earlier Occupation Surface, F78
2N 36W
6N 32W
8N 28W
6N 26W
4N 24W
2N 22W
2S 24W
2S 30W
0N 34W
3.3
3.1
2.9
2.7
2.5
2.3

Figure 6-7. Plan view of Housepit 1, 45-OK-250.

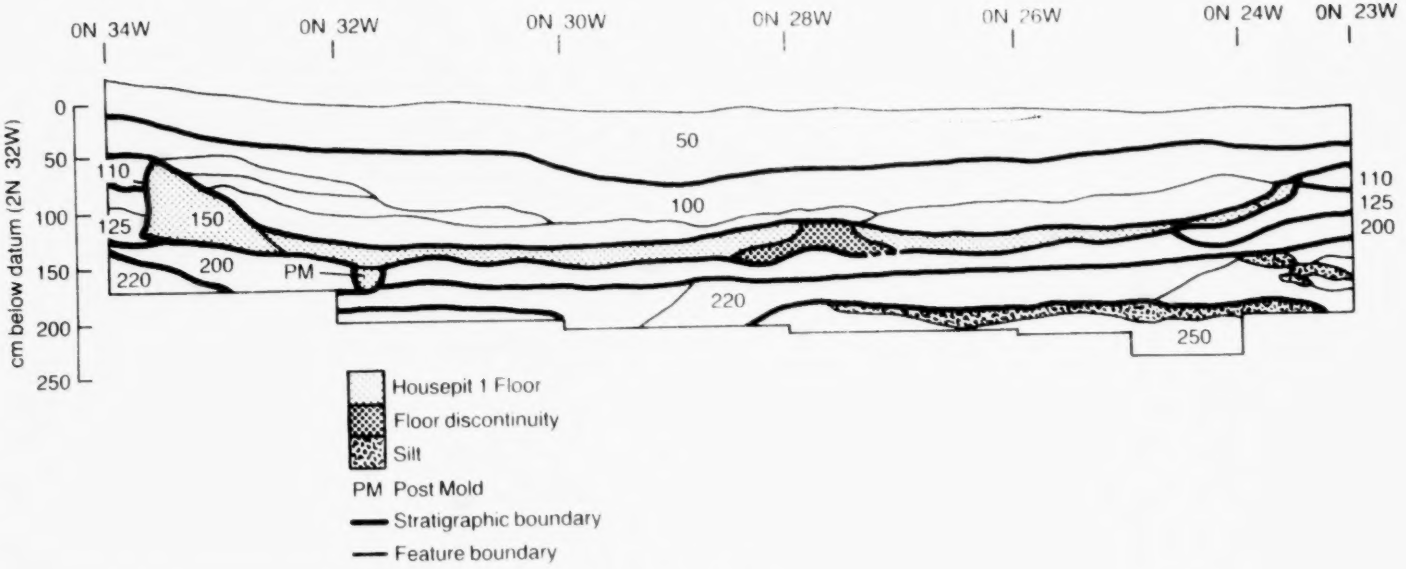

0N 34W
0N 32W
0N 30W
0N 28W
0N 26W
0N 24W
0N 23W
cm below datum (2N 32W)
0
50
100
150
200
250
50
100
110
125
150
200
220
PM
220
250
110
125
200
Housepit 1 Floor
Floor discontinuity
Silt
PM Post Mold
Stratigraphic boundary
Feature boundary

Figure 6-8. East-west transect of Housepit 1, 45-OK-250.

Housepit 1 (Figure 6-7). A radiocarbon date of 3453±97 B.P. from this feature is 200 to 400 years older than dates from the Housepit floor.

The floor of Housepit 1 (F7) is a thick deposit, which may reflect many seasons of use. The sheer frequency of material, while lower than in the Dump to the south, also suggests multiple occupations (Figure 6-9).

Fifteen pits inside Housepit 1 have been classified as postmolds (Table 6-6) although neither their contents (see Chapter 5) nor positions confirm this function. Thirteen of the pits consisted of a cylinder of oxidized sand enclosing carbon stained matrix or squared off pits containing charcoal staining. Nearly all had FMR at the bottom. There is no clear pattern in their locations and probably not all are contemporaneous. Two other interior pits are grouped with the postmolds, 7 (F135) and 8 (F134) because they may be elaborate post supports. However, their function is open to interpretation. Each consisted of large, flat fire modified basalt spalls lying horizontally within smaller, primarily basalt spalls arranged vertically around its perimeter. The features are thus shallow, stone lined pits 25 to 30 cm in diameter extending 10 to 15 cm below the floor. They may represent bases for central posts against which smaller beams leaned. However, the field notes describe the association of the features with darkly stained matrix largely made up of fire decomposed granite located just to the south. Figure 6-9 shows the greatest number of FMR (38-77) on the central floor from 3N29W. We interpret this area as a central hearth, perhaps removed or cleared from the

Table 6-6. Postmolds and pits, Housepit 1, 45-OK-250.

Feature Type	Feature #	Length (cm)	Width (cm)	Depth[1] (cm)	Bone		FMR		Other
					#	wt (g)	#	wt (g)	
Postmold									
1	133	25	20	10	14	3[2]	6	165	-
2	-	20	15[3]	25	-	-	-	-	-
3	126	25	20	25	20	5	1	780	-
4	116	25	20	20	-	-	2	275	-
5	138	45	40	5[3]	64	16	-	-	1 flake
6	56	30	30	35	11	1	-	-	-
7	135	25	25	10	-	-	19	3,730	-
8	134	30	30	15	137	34	14	3,310	3 flakes, 18 shell
9	-	25	25	20	-	-	-	-	-
10	102	20	30	20	-	-	5	452	-
11	130	20	10[3]	20	2	<1	2	3,630	-
12	123	20	15	17	56	10	-	-	6 flakes, 5 pieces of shell
13	124	20	20	22[4]	53	8	-	-	5 pieces of shell
14	122	40	30	20[4]	180	40	4	60	3 flakes
15	-	20	20	20	-	-	-	-	-
Pit									
16	121	12	12	4	19	2	-	-	587 flakes, 29 stone

[1] Below floor.
[2] Includes one salmon vertebra.
[3] Incomplete measurement.
[4] Rodent disturbed.

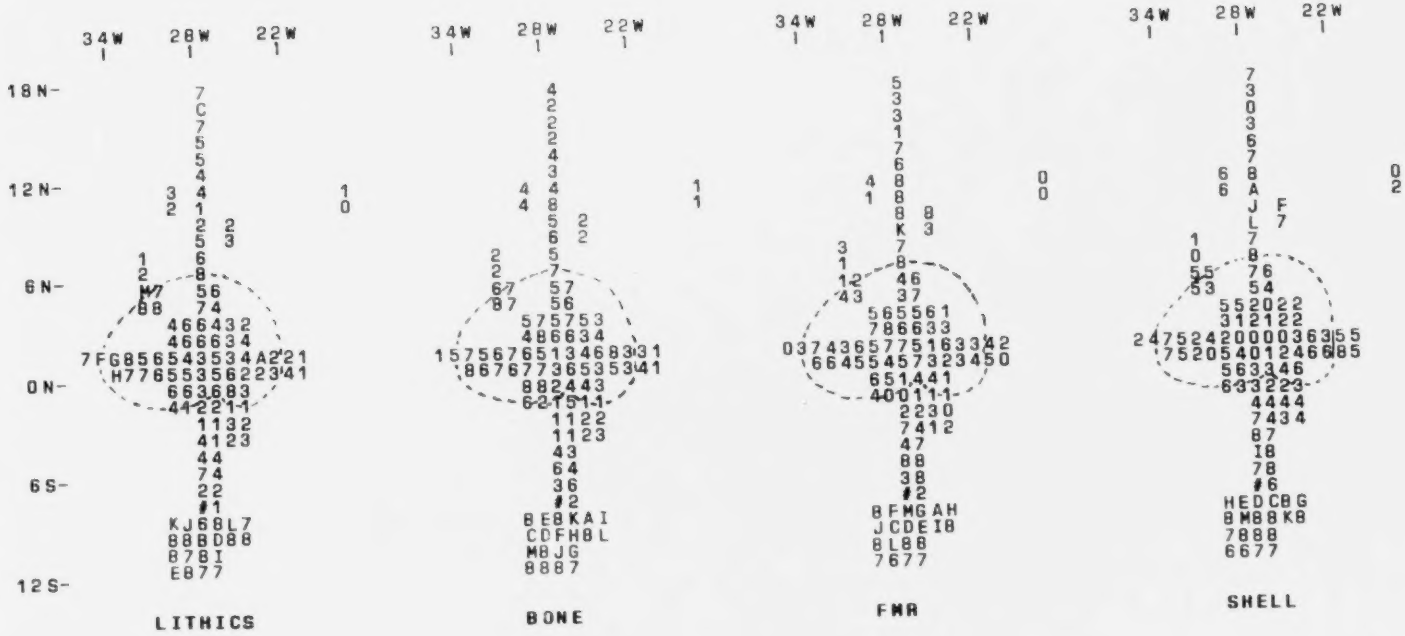

34W
28W
22W
18N-
12N-
6N-
0N-
6S-
12S-
LITHICS
BONE
FMR
SHELL

Figure 6-9. Distribution of major material classes, Zone 13, 45-OK-250. See Table 6-7 for explanation. Dashed lines show boundary of Housepit 1.

Table 6-7. Data for distribution maps, Figure 6-9, 45-OK-250.

Statistic[1] Division	Material Class							
	Lithics		Bone		FMR		Shell	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1	0	10	1	153	0	2	0	1
2	12	19	163	250	3	4	2	4
3	20	25	252	349	5	9	5	11
4	26	34	368	514	10	13	12	19
5	37	42	558	711	14	17	21	49
6	44	55	718	869	18	26	52	96
7	56	77	886	1,271	28	37	119	257
8	80	119	1,287	3,189	38	77	260	766
A	675		6,732		154		3,587	
B	443		6,653		146		3,186	
C	266		5,943		126		3,025	
D	247		5,632		118		2,255	
E	212		5,304		113		2,253	
F	190		5,129		106		2,087	
G	180		4,963		106		1,443	
H	157		4,893		104		1,356	
I	151		4,171		97		1,348	
J	140		4,059		95		1,220	
K	138		3,663		90		881	
L	132		3,589		85		814	
M	120		3,355		79		809	
Mean	61.9		1,140.3		28.2		295.6	
S.D.	83.5		1,488.4		33.7		652.4	
Count	117		117		117		117	
Sum	7,238		113,410		3,295		34,585	
Sum^2	1,264,248		411,320,162		225,751		60,025,433	
Variance	6,978.5		2,215,372.3		1,136.4		425,659.5	

[1] The data has been mapped by alphanumeric codes for nine divisions of the cumulative frequency class counts. Divisions are adjusted so that score ranges are not overlapping and zero scores are always mapped as zero. The ninth division is broken down further by use of letter codes for each score from highest to lowest.

higher frequency on the perimeter of the structure. We temper the significance of these frequencies by recalling the amount of matrix included in the floor (F7) in these areas. The feature was 60-80 cm thick on the north and west and 30-40 cm thick on the south and east edges of the structure (see, for example, Figures 6-5 and 6-8). In contrast the interior areas of the floor are 15-20 cm thick. Given further time, a more accurate representation of relative density of major material classes could be prepared by calculating the density. In any case, the high frequencies and accumulation of matrix on the perimeter suggest disposal as does the coincidence of material classes as in 7N28W, 1N34W, 2N34W, and 2N24W.

More specific suggestions about activities which took place in the house floor can be made from the distribution of major material classes and formal object types when considered in light of the field notes. The occurrence of high bone frequency in a single central unit (3N29W) in proximity to the specialized interior pits (F134, F135) and FMR supports the interpretation suggested above of food preparation at hearthside. Unit 5N32W shows high bone and lithic frequencies. This and the adjacent units have numerous pieces of modified bone, tabular knives, and utilized debitage. Figure 6-7 shows that many pieces of bone were large enough to be collected separately and field notes indicate they were collected within a vertical range of 20 cm. We may interpret this area as a bone working station. The high frequencies of lithics along with cores, bifaces, drills, and projectile point tips suggest lithic reduction perhaps in support of or in addition to the bone working.

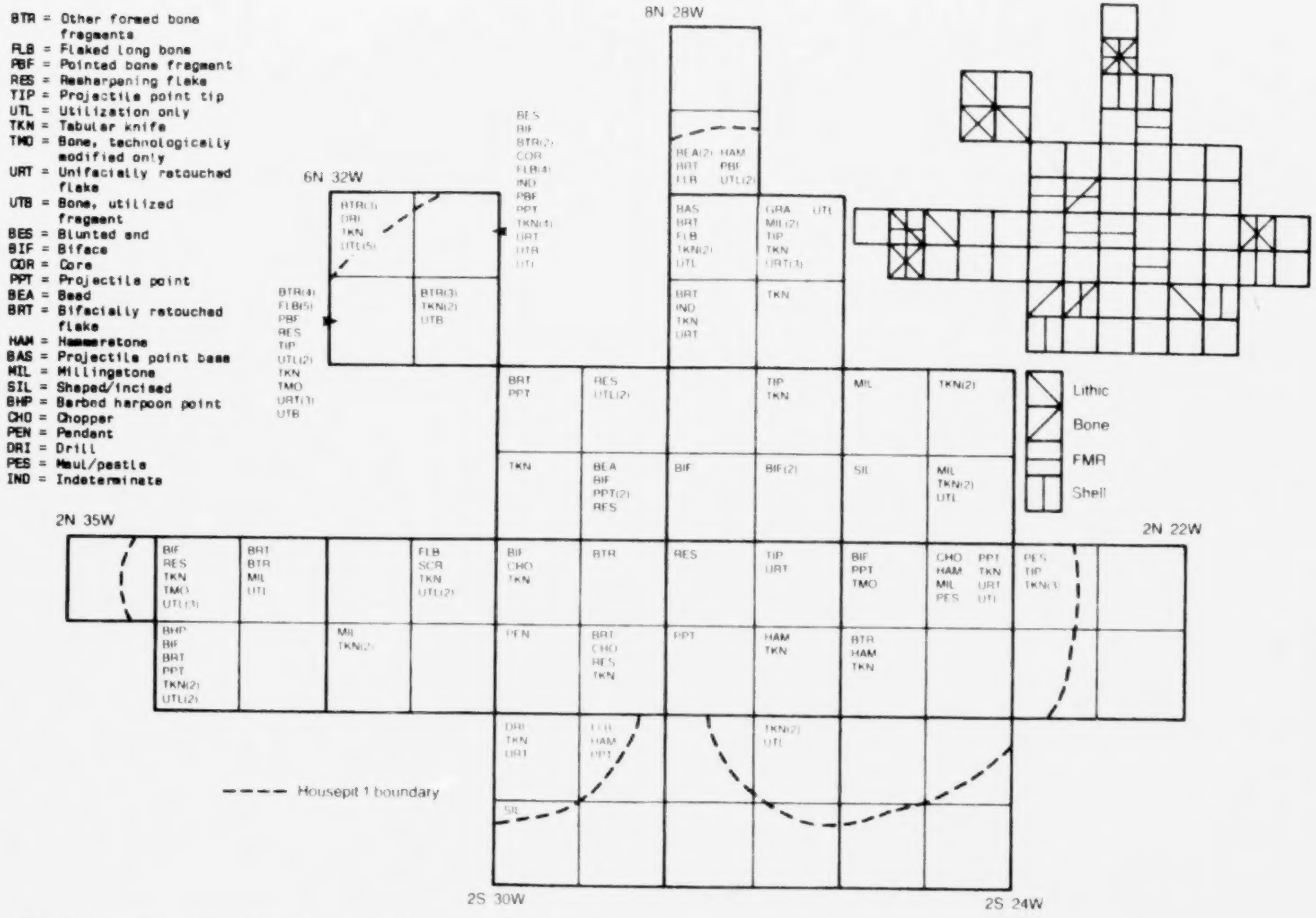
Another area of bone high frequency is interpreted as a food processing area rather than a bone working area. High bone frequencies occur in 1N34W, accompanied by lithics and shell. The adjacent unit to the north has high frequencies of lithics, FMR, and shell. There are few modified bone artifacts. Utilized debitage, two bifaces, tabular knives, a bone harpoon point, and a projectile point are located in close proximity to two millingstones. Figure 6-7 shows numerous pieces of bone complete enough for identification scattered to the west of the millingstones. Field notes state most of the catalogued bone, formed objects, and numerous large cryptocrystalline flakes were found in the lower portion of F7 within two 10 cm levels. The association of large bone fragments and shell with the millingstones suggests food processing and subsequent waste disposal at the edge of the structure. Tabular knives, bifaces, and utilized debitage may have been used to remove meat and sinew remnants from bone before it was crushed for marrow extraction or to open the shellfish. The projectile point and bifaces along with the high lithic frequencies suggest lithic reduction. In sum, the area appears to represent the blending of several activities accompanied by general refuse disposal.

We suggest processing of bone and shellfish, accompanied by discard of refuse, as activities in two other areas. High frequencies of bone are also found in 0N29W and 30W and 2N26W accompanied by shell in the same or adjacent units. Unit 2N26W also has a high frequency of lithics resulting from the presence of a lithic cache (Pit 16, F121). Each area is marked by the presence of hammerstones or pestles, tabular knives, projectile points, or floor by the latest occupants. The stone lined pit features could then represent supports for cooking apparatus such as boiling baskets adjacent to the hearth. Our search of the literature has provided little additional information about similar features. Dumond and Minor (1983:33,36) describe a stone lined pit associated with a living surface dated to 3380±160 B.P. (GAK-1669) at the Wildcat Canyon Site on the Mid-Columbia River. They make no suggestions as to its function.

The remaining interior pit, Pit 16 (F121), provides evidence of at least one lithic reduction incident within Housepit 1. The circular depression measured 12 x 12 x 4 cm extending below the floor into a stratum of water-rounded gravels (Stratum 126). It contained 586 flakes greater than 1/4 inch in length and 21.0 g of small pressure flakes and prismatic shatter less than 1/4 inch in length (approximately 3780 flakes at 180 flakes/gram). In addition a projectile point tip, drill, graver, two cores, four bifacially retouched flakes, two unifacially retouched flakes, and 18 utilized flakes were classified. Most of the 7 1/4 inch material was called opal (82.3%) with jasper (17.1%) and chalcedony (0.7%) also recorded. The <1/4 inch debitage seems on cursory examination to follow the same distribution. Most pit contents, despite the material type categorization, are most likely to have arisen from the reduction of the same or similar pieces of primary material. Nodules of locally available cryptocrystalline silica generally consist of smaller pieces of more workable lithic material surrounded by less desirable opal with little evidence of weathered cortex. Opal tends to fracture conchoidally but is brittle and inadequate for many tool types. Variation in color, surface texture, and weight have resulted in the present material type classification. Only 7.5% of the 615 flakes and formed objects showed cortex.

The small size of the debitage (mean length for complete artifacts >1/4 inch =1.09 cm, s.d.=0.42 cm, N=3290) suggests reduction immediately over the shallow pit. The size and formal object types suggest the latter stages of bifacial reduction were involved. The formed objects are neither finely finished or broken and, along with other larger pieces of debitage, may have awaited further reduction. Flaking over waste baskets and disposal of debitage in pits is not recorded in local ethnographies, but is recorded elsewhere (Gallagher 1977) and seems a reasonable solution to problems of housekeeping and storage within a confined interior space.

Frequency maps of house floor materials (Figure 6-9, Table 6-7) give us some clue as to the location of activities, which is reinforced by the distribution of tool types (Figure 6-10). We hesitate, however, to interpret the distributions as representing discrete activities. Evidence for long term, multiple use of the house means that the likelihood of certain activities remaining restricted to a single area is small. Additionally, accumulated by-products are likely to result in "smearing" of any but the most consistently repeated, spatially restricted activities. The central hearth area of the dwelling appears to be one area of consistent use. It is marked by comparatively lower frequencies of lithics, shell, and with the exception of 3N29W, bone (Figures 6-9 and 6-10) and high frequencies of FMR. The most obvious interior spatial patterning of the major material classes is their



BTR = Other formed bone fragments
FLB = Flaked long bone
PBF = Pointed bone fragment
RES = Resharpening flake
TIP = Projectile point tip
UTL = Utilization only
TKN = Tabular knife
TMO = Bone, technologically modified only
URT = Unifacially retouched flake
UTB = Bone, utilized fragment
BES = Blunted end
BIF = Biface
COR = Core
PPT = Projectile point
BEA = Bead
BRT = Bifacially retouched flake
HAM = Hammerstone
BAS = Projectile point base
MIL = Millingstone
SIL = Shaped/incised
BHP = Barbed harpoon point
CHO = Chopper
PEN = Pendant
DRI = Drill
PES = Maul/pestle
IND = Indeterminate

8N 28W
6N 32W
2N 35W
2N 22W
2S 30W
2S 24W
BES BIF BTR(2) COR FLB(4) IND PBF PPT TKN(4) URT UTB UTL
BEA(2) HAM BRT PBF FLB UTL(2)
BTR(3) DRI TKN UTL(5)
BAS BRT FLB TKN(2) UTL
GRA UTL MIL(2) TIP TKN URT(3)
BTR(4) FLB(5) PBF RES TIP UTL(2) TKN TMO URT(3) UTB
BTR(3) TKN(2) UTB
BRT IND TKN URT
TKN
BRT PPT
RES UTL(2)
TIP TKN
MIL
TKN(2)
TKN
BEA BIF PPT(2) RES
BIF
BIF(2)
SIL
MIL TKN(2) UTL
BIF RES TKN TMO UTL(3)
BRT BTR MIL UTI
FLB SCR TKN UTL(2)
BIF CHO TKN
BTR
RES
TIP URT
BIF PPT TMO
CHO HAM MIL PES PPT TKN URT UTI
PES TIP TKN(3)
BHP BIF BRT PPT TKN(2) UTL(2)
MIL TKN(2)
PEN
BRT CHO RES TKN
PPT
HAM TKN
BTR HAM TKN
DRI TKN URT
FLB HAM PPT
TKN(2) UTL
SIL
Lithic
Bone
FMR
Shell
Housepit 1 boundary

Figure 6-10. Distribution of functional tool types, Housepit 1 and associated features, 45-OK-250.

point fragments and utilized debitage. Field notes and Figure 6-7 indicate much of the bone was large fragments of artiodactyl limbs, ribs, vertebrae, skulls, jaws, and antlers with maximum vertical separation of 10-15 cm. The materials in 2N26W are in close proximity to millingstones, hammerstones, and choppers, an arrangement similar to that on the opposite (west) side of the structure. We suggest excavation of the rest of the structure perimeter would have revealed similar accumulations of refuse with large bone fragments. The area of 2N26W is further distinguished in Figure 6-7 by numerous quartzite flakes only three of which were classified by analysis as tabular knives. Additional lithic reduction in this area would account for the flakes, although the limitations of the classification regarding tabular knives (see Chapter 3) may have caused bias against their recognition as useful tools.

The remaining area of high frequencies of material and formed objects we interpret as primarily refuse disposal. In the area of 6N to 7N28W we see high frequencies of lithics, shell, and FMR but high frequencies of bone are lacking (Figure 6-10). A variety of formed objects is represented. Field notes indicate the material is vertically separated by 30-40 cm. Although bones are not in high frequency, the field notes describe the occurrence of clumps of splintered long bone and clusters of FMR within the thick floor matrix. There is infrequent mention of large lithic debitage. We interpret the configuration of this material and the assortment of formed objects as representing primarily refuse disposal with little distinguishable overlay of other activities despite the presence of two millingstones exposed in the same excavation level.

We can say little about the distribution of the remaining formal object types on the structure floor other than to note the association of bifaces and possibly projectile points with the proposed central hearth area. We hesitate to interpret this as evidence of sexual division of labor associating males with projectile points and bifaces which may be precursors to projectile points. We can as easily interpret it as evidence of female activities with bifaces and projectile points used for light scraping and cutting tasks around the hearth or projectile points removed from meat during final butchering and food preparation.

Similarly, the distribution of millingstones does not prompt us to speculate on the social composition of the occupants (cf. Brauner 1976). Seven millingstones are spaced within about a meter of the wall along with two and possibly three additional stones with no apparent surface wear (Figure 6-7). We could suggest the grouping of these stones on opposing sides of the structure represented two foci of grinding/plant processing representing two separate families. However, we have demonstrated that the millingstones are equally well associated with bone processing. While not out of the question, it seems unlikely that plant foods gathered in the spring and summer would be processed in an interior space. There is, of course, the possibility of post-storage pounding and grinding of plants, fish, and meat. The presence of seven support stones and possibly more from unexcavated portions of the floor seems an excess of tools for so small a space. Most likely all were not in use simultaneously with some functioning as "furniture rocks". Notably, they do not clutter the interior portion of the floor, freeing it for sleeping and other activities. Finally, the number may be a result of repeated use of the structure with women of changing social units moving a favorite support stone indoors and removing others or relegating them to the furniture category.

Firepit 2, an exterior firepit just on the east side of Housepit 1, is contemporaneous with the housepit according to radiocarbon dates and stratigraphy. This firepit was partially exposed by 2N22W, and was about 15 cm deep. A smaller (ca. 25 cm across) central area of burnt soil was surrounded by several fire-modified rock, a few small pieces of bone, and 19 gms of shell fragments. The radiocarbon date of 3194±153 B.P. (B-4338) is bracketed by the two youngest dates from the Housepit 1 floor, suggesting temporal equivalence of Firepit 2 and Housepit 1.

Housepit 2

This housepit was recorded in 12N30W (F12) and the 28W trench cuts its eastern rim (F113,70) (Figure 6-3 and 6-4). Housepit 2 was not recognized during excavation and very little of it was exposed. It is only 40 cm deep in the west profile of the trench. Material density is not as high as on the Housepit 1 floor (Figure 6-9) and carbon staining is not as prominent. Housepit 2 is sealed by an aeolian fill identical to that which covered Housepit 1 (Feature 6, fill). They are then, according to stratigraphy, very close in time. However, Housepit 2 truncates Midden Surface 2, which postdates or is contemporary with Housepit 1. This sequence of features indicates rapid cultural and natural deposition.

Other Zone 13 Features

Surface 2 (F47) very clearly is a midden deposit: a 20-30 cm thick layer of bone, shell and FMR which slopes south, ending and mixing with the fill above Housepit 1 (Figure 6-4). It either postdates or is contemporaneous with Housepit 1; but, if we assume that the occupants of Housepit 1 did not throw their trash uphill, then Midden Surface 2 may be associated with activities to the north.

The next major feature complex exposed in the 28W trench is Dump Stratum II, a 10-25 cm thick layer of two closely related lenses of debris (Figure 6-6;c). The lower of the two (F68,95) is an intensely stained layer originally thought to be a housepit floor because of the amount of charcoal, the number of tools (Table 6-3, Figure 6-9) and the presence of Pit 1 (F112). There is little evidence of the truncation of natural strata by cultural ones to suggest excavation for a structure. In addition the area is marked by frequencies of cultural material much greater than in either Housepit 1 or 2 (Figure 6-9). We cannot rule out the possibility that Dump Stratum II may represent refuse disposal into an abandoned structure depression, however, since we have recovered evidence of the dumping and little for a structure we designate this feature as a dump.

Pit 1 (see Table 6-5 for dimensions) was packed with FMR at the bottom, but its upper matrix was identical to the midden deposit. Its presence and that of a firepit below the midden do suggest that an activity surface formed here prior to the trash accumulation.

The upper layer (F11) of Dump Stratum II is a shell feature which only partially covers the lower layer. In addition to large quantities of shell, bone, chipped stone and FMR are found among the debris in high frequencies. The matrix underlying the shell is dark from organic staining due to decomposition of bone and shell as well as the presence of charcoal.

There is a slight inversion of radiocarbon dates between Firepit 3 and Dump Stratum II. The firepit (Figure 6-11), a circular depression containing FMR and small amounts of bone, shell and debitage, is dated to 3143±85 B.P. The date was taken from charred bitterbrush and hackberry parts. A piece of semi-charred Douglas fir yielded a date of 3323±105 B.P. for the dump stratum. The inversion of dates, along with the extremely high density of bone and lack of evidence of a structure, support the contention that Stratum II is a midden deposit and not a living surface.

Several shell and FMR concentrations were found outside the trench area (Figure 6-3).

Shell Concentration C (F2) is a thin layer of shell in the eastern half of the site. Some FMR also occurred, along with a utilized and unutilized flake, and a drill. The shell occurred mainly in small discrete clumps.

Shell Scatter D (F77) contains a few very small clusters of shell, with bone fragments and some associated charcoal staining. It may represent several discrete episodes of disposal.

A small portion of midden (F54) was exposed in 8N38W. This was a 20-30 cm deposit of irregularly distributed bone, lithic debitage and shell. The shell occurred in several, separable layers, each about 5 cm thick. A millingstone, with some pieces of shell adhering to the top, was associated with one of the shell layers. Most of the bone was charred; only some deer molars could be identified to species.

Occupation Surface 7 (F20) occurs in 10S40W. It is a concentration of some very large and very small FMR in a matrix of brown silty sand. The largest FMR formed a circular cluster around a red jasper biface. The striking element of this feature is the large number of fish bone (24 salmon vertebrae identified). Fish bone is not a major constituent of any other feature at 45-OK-250, although it is common in the housepits at 45-OK-4.

FMR Cluster D (F1) is found in the southeast corner of 8N42E on the far eastern side of the site. The granite rocks, averaging over 1 kg in weight, formed a small pile.

In 20S52W, the northern edge of a shell concentration (F26) was uncovered below a pit-like feature (F16) which was also full of shell. Shell Concentration F was only 10 cm thick and sloped slightly south out of the unit. Originating about 40 cm above it, still within Zone 2, is possible Pit 2, an oblong feature 30 cm deep. Like Pit 1, this appears to be a trash pit. It contains large amounts of shell very large FMR (ca. 1 kg average weight), several stone tools, and lithic debris. The large size of the bone (ca. 1 g

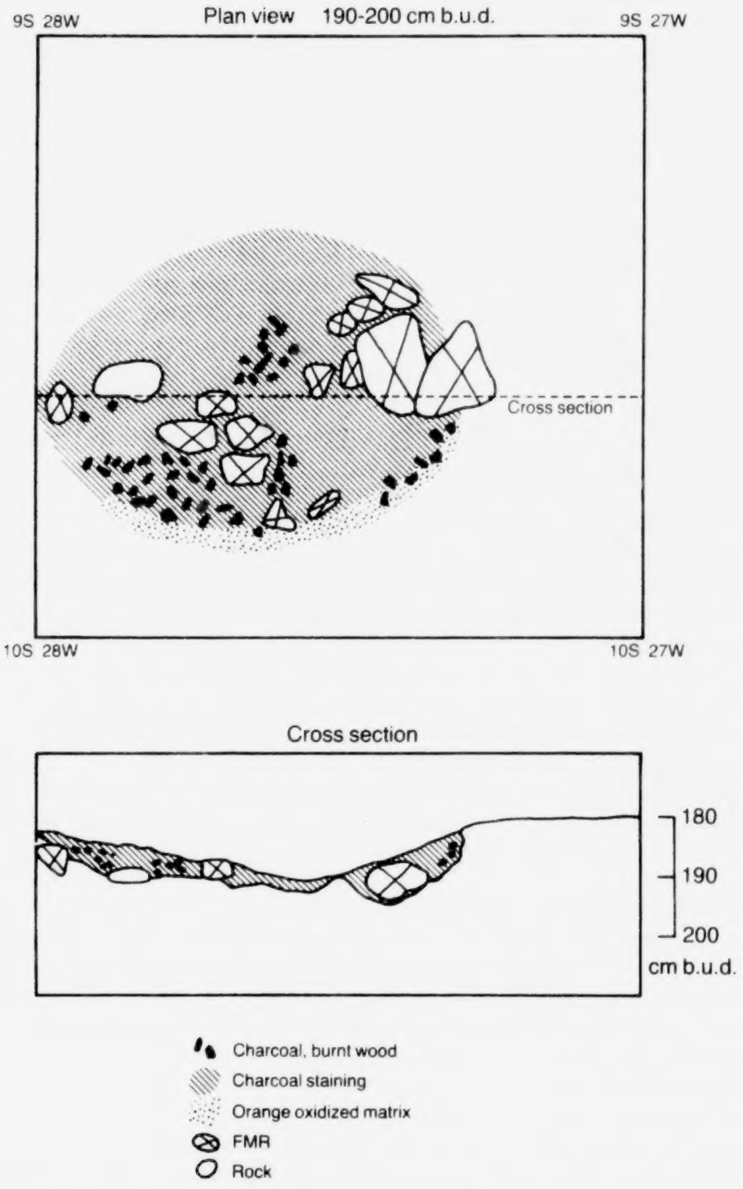

9S 28W
Plan view 190-200 cm b.u.d.
9S 27W
Cross section
10S 28W
10S 27W
Cross section
180
190
200
cm b.u.d.
Charcoal, burnt wood
Charcoal staining
Orange oxidized matrix
FMR
Rock

Figure 6-11. Plan view of Firepit 3 (Feature 132), 45-OK-250.

average weight) may be the reason so many pieces were identifed: 8% of the bone was identified compared to the more usual figure of less than 1%. Two salmon vertebrae, turtle plastron fragments, and deer bone occurred (Table 6-5). All this material was contained in a darkly stained matrix.

ZONE 51

Shell concentrations and clusters of FMR are the major type of feature in Zone 51; a large pit is recorded in the dump, and another pit and three surfaces also occur (Figure 6-12). Table 6-8 records the basic descriptive and content information of features in Zone 51.

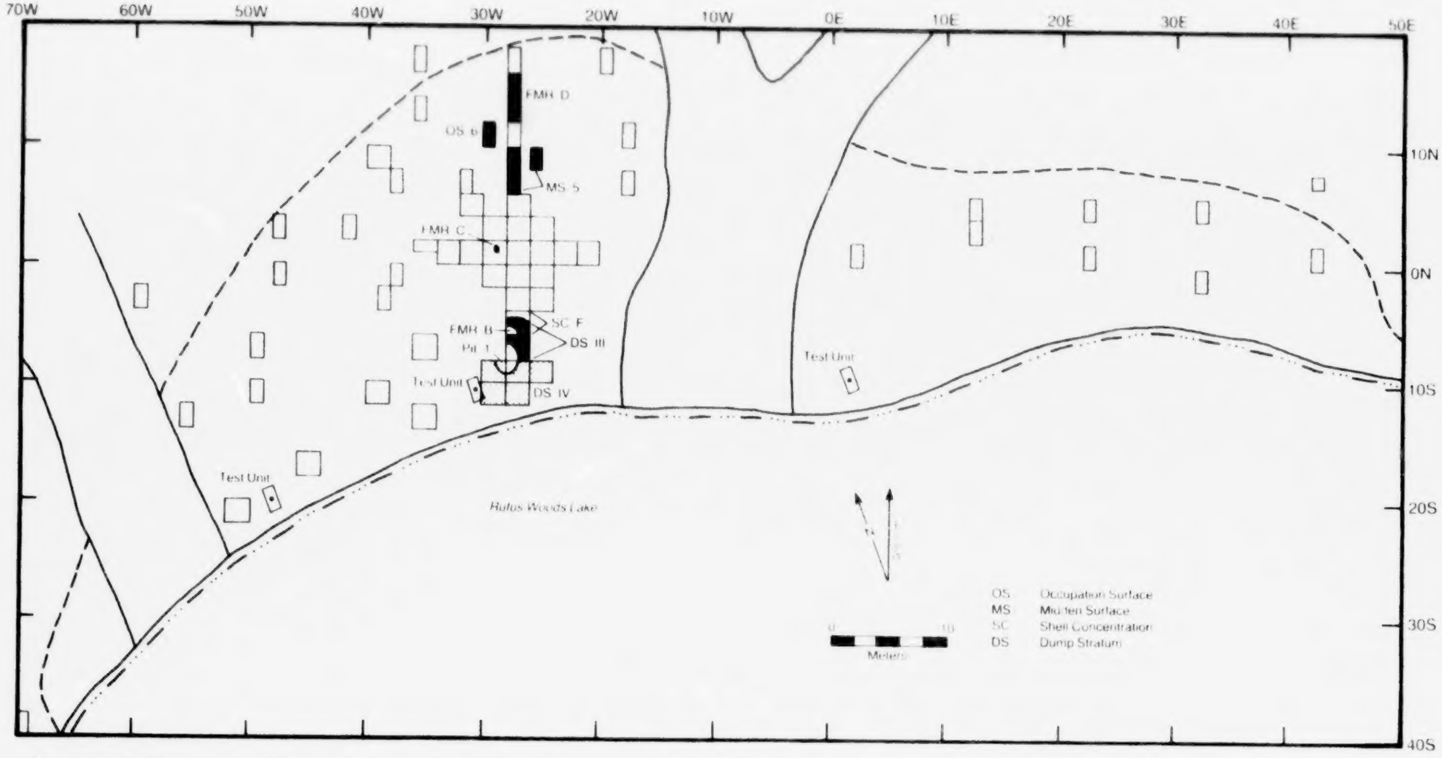
A large pit (F136) was excavated at the northern end of the dump, truncating Dump Stratum II (Figure 6-6 and 6-13). It is straight-sided, about 80 cm deep on the uphill side, 50-60 cm deep on its downhill side and 160 cm in diameter. Because of its indistinct upper boundary, Pit 3 was not recognized as such until much of it had been excavated. Only the final 20-30 cm of the pit was recorded as Feature 136, so the material counts in Table 6-8 must be viewed as a sample of the whole. This problem may be academic, however, since profiles show most, if not all, of the pit fill consists of layers of secondary deposits, slumped or thrown into the pit from its northern lip. The density of material, which matches Dump Strata I and II, suggests Pit 3 was filled with trash. The original purpose of its excavation, other than trash disposal, is not apparent.

Just north of and spilling into Pit 3 is thick shell stratum (F114) with high shell content and other types of debris (Figure 6-6). Although technically outside the dump, we have called the feature Dump Stratum III because it is obviously a midden and is in the same general area. To the south and overlying Dump Stratum III is Dump Stratum IV, a thick (30-40 cm) deposit of brown silty sand. Because its material density is greater than the natural strata that separate Dump Stratum I and II, and Dump Stratum II and IV, we have described it separately here. Unlike Dump Stratum III, the primary material class represented here is bone scrap: seven faunal species have been identified (Table 6-4), and some of the identified bone is charred or carries butchering scars.

Moving north along the trench, FMR Cluster B (F106) was found in 4S28W. Only five FMR, forming an arc across the southwest corner of the unit, were recovered. Some bone scrap, shell fragments and debitage occurred in the unstained matrix.

Another cluster of small FMR (FMR Cluster C, F94) occurs above the fill of Housepit 1, in a 25 x 25 cm area. Again, no charcoal staining was associated.

A fifth surface, this one a midden (Midden Surface 5, F29), occurs just south of the Housepit 2 fill. Bone (including a dog skeleton), FMR and lithics were distributed throughout the 40-cm thick deposit. A millingstone with broken and crushed shell around it was found within this lens. This association underscores the usefulness of our lumping of middens and activity areas as "Surfaces." In this case in situ activities are recorded in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40E
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10N
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10S
20S
30S
40S
FMR D
OS 6
MS 5
FMR C
FMR B
Pit 1
SC F
DS III
DS IV
Test Unit
Test Unit
Test Unit
Rufus Woods Lake
Meters
0
10
OS Occupation Surface
MS Midden Surface
SC Shell Concentration
DS Dump Stratum

Figure 6-12. Location of features, Zone 51, 45-OK-250.

Table 6-8. Dimensions, provenience and contents of features, Zone 51, 45-OK-250.

Feature	Provenience	Dimensions	Estimated Excavated Vol. (m³)	Lithic Debitage	Tools		Bone		Shell		FMR	
					Stone	Bone	#	wt (g)	#	wt (g)	#	wt (g)
Analytic Zone 12												
Dump Area												
Pit 3	8-8S28W	150 cm diameter; 60 cm deep	0.392	44	5	–	3,638	1,044	1,701	–	71	10,180
Dump Stratum III	4-6S28W	2x3 m; 20-30 cm thick	1.292	301	30	–	9,971	2,335	4,330	–	230	15,745
Dump Stratum IV	8-12S;26-30W	4x6 m; 30-40 cm thick	5.125	552	47	3	11,596	2,434	1,305	–	426	38,421
FMR Cluster B	4S28W	60 cm radius; 25 cm deep	0.150	6	–	–	117	40	41	–	5	12,990
FMR Cluster C	2N30W	25x25x10 cm	0.075	–	–	–	–	–	–	–	18	2,180
(Midden) Surface 5	10N26-28W	Irregular, 30-40 cm thick	0.690	51	17	2	893	280	2,376	6,072	280	20,989
Occupation Surface 6	12N30W	1x2x0.20	0.150	2	2	–	158	39	147	620	17	1,228
FMR Cluster D	14N28W	1x2x0.15	0.300	–	3	–	–	–	–	–	50	25,773
Analytic Zone 11												
Shell Concentration F	4S28W	1x2x0.20	0.200	–	1	–	99	23	248	–	12	1,470

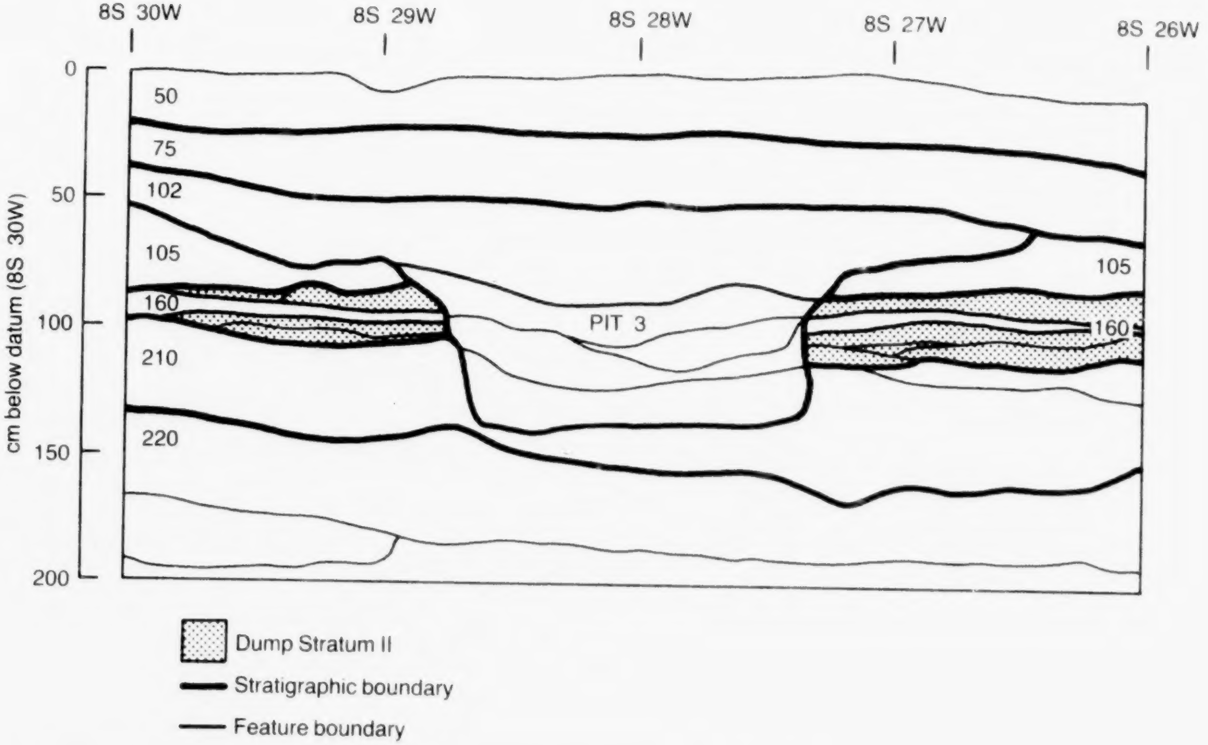

8S 30W
8S 29W
8S 28W
8S 27W
8S 26W
0
50
100
150
200
cm below datum (8S 30W)
50
75
102
105
160
210
220
PIT 3
105
160
Dump Stratum II
Stratigraphic boundary
Feature boundary

Figure 6-13. East-west profile of Pit 3, Zone 51, 45-OK-250.

essentially midden deposits, while obvious episodes of disposal can be seen on occupation surfaces. While a surface may have functioned primarily as one or the other, there are often elements of both.

Ten cm thick Occupation Surface 6 (F8) was recorded above Housepit 2 in 12N30W. The soil was stained and compacted with some spots of oxidized sand. A cobble chopper and some FMR were closely associated with a cluster of shell fragments which lay among and beneath the stones.

A large concentration of FMR (FMR Cluster D, F108) was recorded above the Housepit 2 fill in the trench (Figure 6-4). All rocks collected from the feature were fire-modified, including an anvil stone, a chopper, and a millingstone. This concentration may represent a poorly developed use surface, perhaps associated with Surface 6.

Shell Concentration F (F101) in 4S28W consists of several small clusters of shell across a brown sandy matrix (Figure 6-6). Some bone and FMR were also recovered as well as a tabular knife. None of the bone was identified. This feature suggests continued use of this slope for debris disposal.

45-OK-4 FEATURES

The cultural features at 45-OK-4 include housepits, firepits, other pits, debris concentrations and occupation surfaces. They are distributed over five of the six analytic zones defined for the site (Table 6-9). Only Zone 33 in Area B lacks cultural features, although it does contain other evidence of cultural occupation (see Chapter 2). Housepits are confined to Zone 52, and date to between 3000 and 2000 B.P. They will be described in detail below in conjunction with the zone by zone feature description. It was difficult to separately excavate the cultural strata, particularly in Area B, because of their complex interbedding and frequent freezing, thawing, and slumping of excavation units. The features described below tend to be more general assignments than appear in stratigraphic profiles. Future re-analysis at 45-OK-4 would benefit from level by level examination of cultural content in relation to the profiles to define more precise zones and isolate cultural phenomena not designated as features in the field.

Several tables offer the basic information from the features at 45-OK-4. Table 6-9 correlates the field-assigned feature numbers with the cultural features described in the text. Table 6-10 details the unit provenience of each feature in Zone 53, feature dimensions, volume as excavated, and a listing of all material. Tables 6-11 and 6-12 indicate the provenience of stone and bone tools, and the identified faunal remains, respectively.

ZONE 53

Two cultural features were recorded in this zone, both in Area A (Figure 6-14). Although each consists organically or carbon stained matrix with large amounts of shell and bone fragments and they are in close proximity, they do not appear to be related. There is no shell concentration recorded in the intervening excavation unit.

Table 6-9. Correlation of features and field designations by zone, 45-OK-4.

Summary Zone	Analytic Zone	Feature Number	Feature Description
53	43	9	Occupation Surface A
		8	Shell Concentration A
52	32	23,24,13	Housepit 5
		20	Housepit 6
		28	Housepit 7 (floor and fill)
		29,33,39	Housepit 2, Floor 2
		30,31,32	Housepit 2, Floor 1
		34,43,44	Housepit 2, Pits/postmolds
		37	Structure A
		35	Occupation Surface B
		11,15	Occupation Surface C
		14	Occupation Surface D
		45	Occupation Surface E
		25	Occupation Surface F, Pit 1
		22	Occupation Surface G, Pit 2
		19	Occupation Surface H
		41	Pits 3 and 4
		40	Occupation Surface I
		38	Occupation Surface J
		36	Occupation Surface K
51	31	26	Shell Concentration C
		-	Firepit 1
	41	3	Firepit 2
		1	Shell Concentration D

Table 6-10. Dimensions, provenience and contents of features, Zone 53, 45-OK-4.

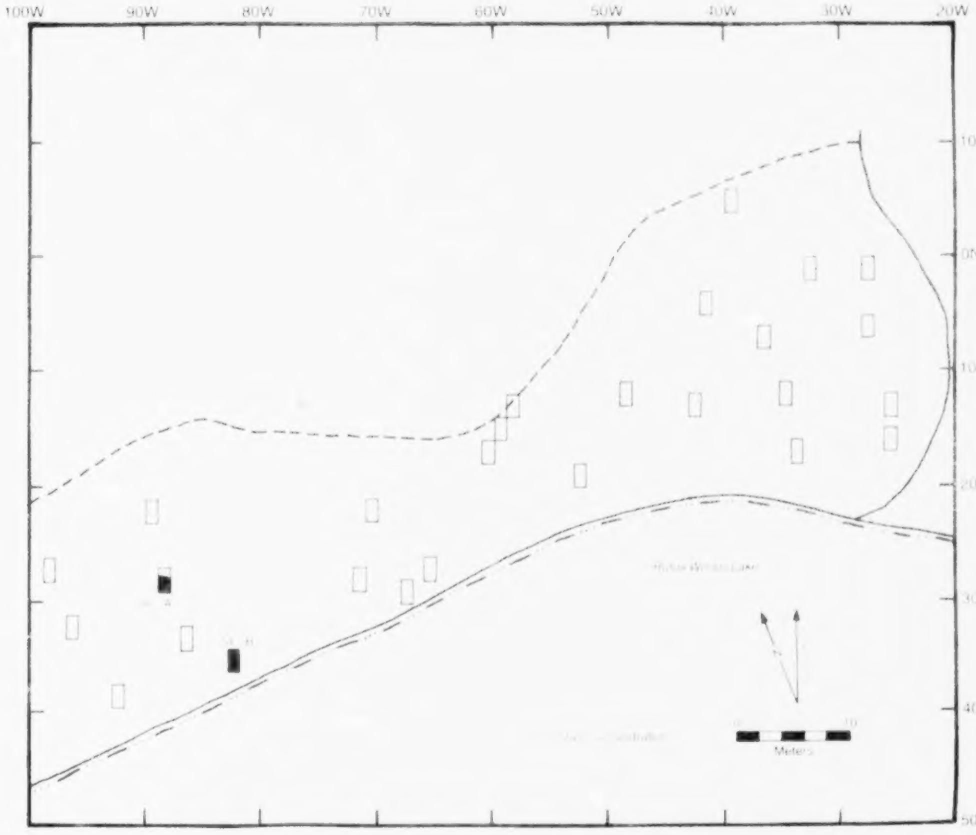
Feature	Provenience	Dimensions	Estimated Excavated Vol. (m^3)	Lithic Debitage	Tools		Bone		Shell		FMR	
					Stone	Bone	#	wt (g)	#	wt (g)	#	wt (g)
Occupation Surface A	2S81W	1x2m; 13 cm thick	0.300	1	1	1	193	63	400	-	4	700
Shell Concentration A	32S83W	1x2 m; 30-40 cm thick	7.25	2	2	-	1,640	655	1,007	-	3	640

Table 6-11. Worn and manufactured stone, bone and shell artifacts from cultural features, 45-OK-4.

Feature	Stone																						Shell	Bone						
	Utilization only	Unifacially retouched flake	Bifacially retouched flake	Resharpening flake	Biface	Projectile point	projectile point base	Projectile point tip	Microblade	Drill	Graver	Scraper	Core	Tabular knife	Hammerstone	Adze	Chopper	Milling stone	Hopper mortar base	Anvil	Stone bead	Shaped/incised siltstone	Indeterminate	Dentalium	Awl	Other formed object	Pointed fragment	Flaked long bone shaft	Other formed bone fragment	Technologically modified only	Bone bead
Zone 53																															
Occupation Surface A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–
Shell Concentration A	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Zone 52																															
Housepit 2																															
Floor 2	2	2	–	–	2	1	–	2	–	–	–	1	–	1	4	–	1	1	–	–	1	–	1	1	1	1	1	–	–	–	1
Floor 1	1	2	–	–	2	2	–	–	–	1	–	2	–	5	2	1	1	3	1	–	3	–	1	1	2	1	2	1	1	–	–
Housepit 5	9	5	1	–	6	9	–	4	1	1	1	–	1	41	–	–	2	–	2	1	–	–	2	–	–	5	–	–	–	–	–
Housepit 6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	3	–	–	1	–	–	–	–	–	–	–
Housepit 7	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	6	–
Structure A	–	1	–	–	–	1	–	1	–	1	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface A	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface B	5	–	–	1	–	–	–	1	–	–	1	–	–	5	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface C	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–
Occupation Surface D	1	–	1	–	–	2	1	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface E	–	–	–	–	–	–	1	–	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface F, Pit 1	–	1	–	–	4	–	1	1	–	–	1	–	–	5	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface G, Pit 2	1	–	–	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–
Occupation Surface H	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	2	–
Pits 3 and 4	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface I	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
Occupation Surface L, Pit 5	1	–	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Midden Surface M	2	–	1	–	1	–	–	1	–	–	1	–	–	14	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Midden Surface N	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–	1	–	–	–	1	–	2	–
Shell Concentration B	–	–	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 6-12. Identified bone fragments from cultural features, 45-OK-4.

Feature	Taxa																
	Deer	Deer-sized	Elk	Elk-sized	Mountain sheep	Sheep/antelope	Cervidae, unknown	Salmonidae	Cyprinidae	Catostomidae	Cricetidae, unknown	Deer mouse	Pocket gopher	Pocket mouse	Marmot	Ground squirrel	Painted turtle
Zone 53																	
Occupation Surface A	6	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Shell Concentration A	12	12	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Zone 52																	
Housepit 2																	
Floor 2	5	17	–	–	–	–	–	53	1	–	–	2	3	1	1	–	6
Floor 1	7	73	–	1	5	7	–	148	1	–	1	–	–	–	1	–	7
Interior pits	–	–	–	–	–	1	–	4	–	–	–	–	–	–	–	–	–
Housepit 5	295	348	–	–	6	2	1	47	2	1	–	2	–	1	–	–	6
Housepit 6	–	1	–	–	–	–	–	4	1	–	–	–	–	–	–	–	–
Structure A	9	2	1	–	–	2	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface B	6	14	–	–	4	–	–	1	1	–	–	–	–	–	–	–	1
Occupation Surface C	20	8	–	–	7	–	–	3	–	–	–	–	–	–	–	–	23
Occupation Surface D	–	2	–	–	–	2	–	1	–	–	–	1	–	3	–	–	–
Occupation Surface E	–	2	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–
Occupation Surface F, Pit 1	12	18	–	–	1	–	–	9	–	–	–	–	–	–	–	–	1
Occupation Surface G, Pit 2	–	7	–	–	–	–	–	28	–	–	1	–	–	–	–	–	–
Occupation Surface H	8	11	–	–	–	–	–	61	–	–	–	–	–	–	–	–	6
Pits 3 and 4	2	8	–	–	1	–	–	22	–	–	–	–	–	–	–	–	–
Occupation Surface I	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–
Occupation Surface K	3	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Midden Surface M	123	34	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–
Midden Surface N	5	17	–	–	–	–	1	–	–	–	–	–	–	1	–	–	–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10
Meters

Figure 6-14. Location of features, Zone 53, 45-OK-4.

Occupation Surface A (Feature 9) is a concentration of shell and bone, 10-15 cm thick, in a sandy matrix immediately above the basal cobble layer. A firepit, 20 cm in diameter and 13 cm deep, was recorded in the north wall of the excavation unit. This surface slopes down to the south, following a natural contour. Carbon taken from near the firepit yielded the oldest date at the site, 3630±113 B.P., placing this feature within the Hudnut Phase.

Shell Concentration A (Feature 8) does not appear to be an activity area. It is much thicker (30-40 cm) and consists of scattered shell, clusters of fragmented bone, and small patches of burned soil or carbon staining. These discrete occurrence of shell, bone and oxidized soil may represent repeated disposal of camp trash.

ZONE 52

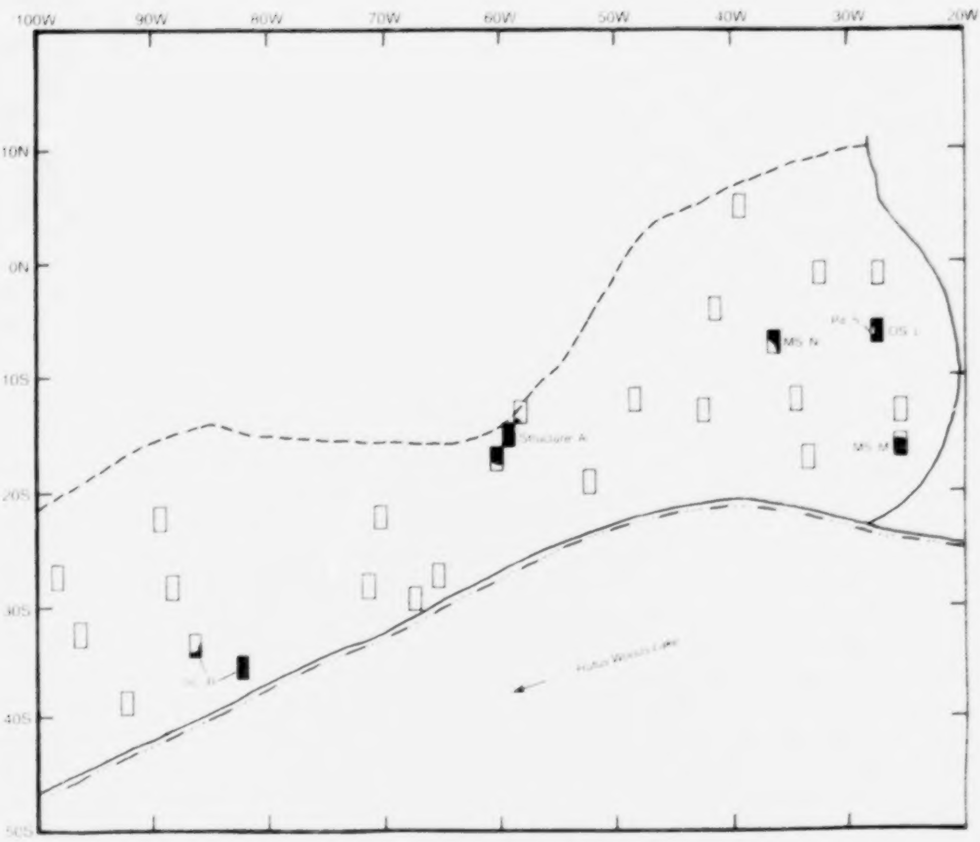
Two housepits from this zone were extensively sampled; at least two others were identified. Only one, Housepit 2, corresponds with surface depressions recorded at the site prior to excavation. A small structure in Area A represents a different type of construction during the same period as the housepit occupations. Other features in Zone 52 include several other large and small pits, shell concentrations and exterior occupation surfaces (Figure 6-15). Table 6-13 outlines provenience, dimensions and contents of features in Zone 52.

Housepit 2 (2097±132B.P.)

Housepit 2 is a fairly large structure, about 10 m in diameter (Figure 6-16), dating to at least 2000 B.P. Its large size may be due, in part, to the numerous reoccupations and modifications to the original pit. Two floors were noted during excavation (see Table 6-13); stratigraphic profiles suggest as many as three (Figure 6-17). The floors were separable only near the rims. The upper floor is dated to 2097±132 B.P.

"Floor 1" represents the lowest floor as well as the central floor area where it appears that several occupations are mixed. It is a narrow (5 cm) band of compacted silty sand, lying immediately above a layer of coarse yellow sand and gravels. Floor 1 was distinctive for its diffuse carbon staining (relative to the upper floor) and the very large number of fish vertebrae, ribs and spines. One hundred and forty-eight vertebrae were identified as salmon (Table 6-12).

Three pits which originate in Floor 1 (Figure 6-16 and Table 6-14) were recorded separately. Interior Pit 7 (F34) in 8S22E is similar to the shallow rock lined pits found in Housepit 1, 45-OK-250. It contained eight fire modified basalt, granite, and quartzite spalls lining a shallow pit with darkly stained matrix within and around it. It is a shallow depression, containing nine large fire-modified rock. Pit 5 was straight-sided, although its intrusion into the cobble-gravel stratum made the walls very irregular. Little was recovered other than small bone fragments; material decreased with depth. Pit 6 (F44) was oval, straight-sided and contained little material.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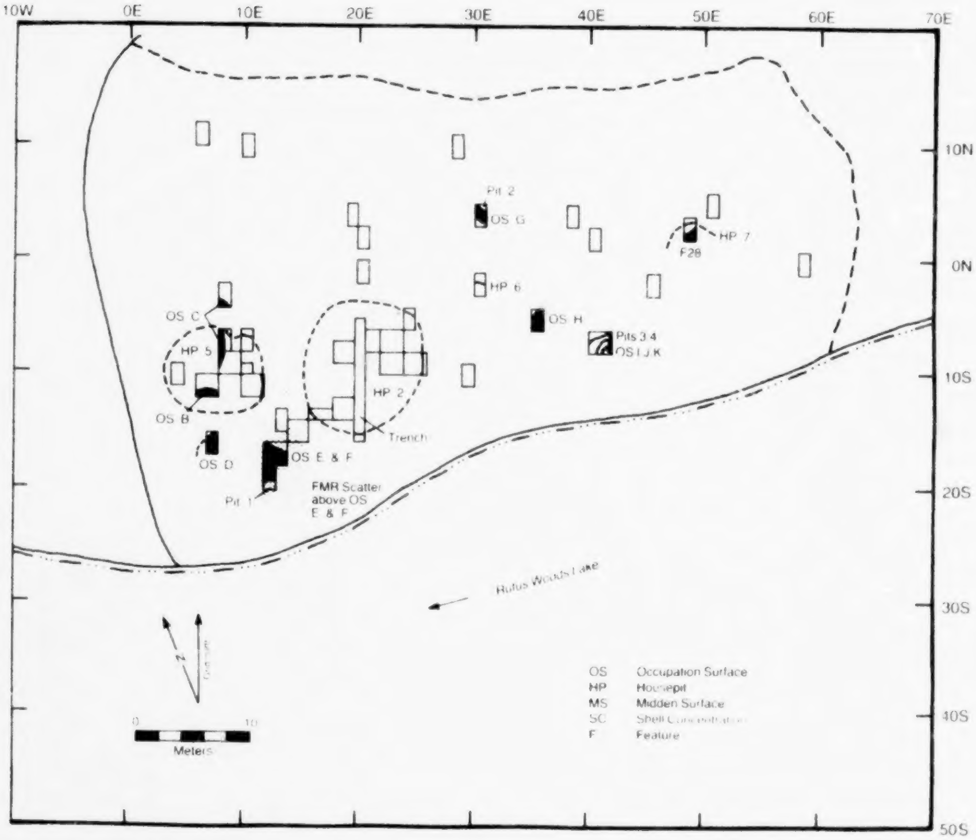
20W
10N
0N
10S
20S
30S
40S
50S
Pit 5
OS L
MS N
Structure A
MS M

Figure 6-15. Location of features, Zone 52, 45-OK-4.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10S
20S
30S
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Pit 2
OS G
HP 7
F28
HP 6
OS H
Pits 3,4
OS I,J,K
OS C
HP 5
HP 2
OS B
Trench
OS D
OS E & F
FMR Scatter
above OS
E & F
Pit 1
Rufus Woods Lake
N
Grid N
0
10
Meters
OS Occupation Surface
HP Housepit
MS Midden Surface
SC Shell Concentration
F Feature

Figure 6-15. Cont'd.

Table 6-13. Dimensions, provenience and contents of features, Zone 52, 45-OK-4.

Feature	Provenience	Dimensions	Estimated Excavated Vol. (m^3)	Lithic Debitage	Tools		Bone		Shell		FMR	
					Stone	Bone	#	wt (g)	#	wt (g)	#	wt (g)
Housepit 2												
Floor 2	14S-12S,14E-18E; 4S24E; 8S26E	10 m diameter; up to 1 m deep	2.567	211	19	5	3,411	572	201	-	87	22,246
Floor 1	6S-13S,16E-26E	10 m diameter; up	3.633	299	28	9	6,953	1,947	366	-	195	30,809
Housepit 5	6S-10S;6E-10E	8 m diameter(?); 40 cm deep	4.100	2,728	86	5	53,463	14,150	575	-	380	64,885
Housepit 6	1S30E	Unknown; 40-50 cm deep	0.850	71	5	1	309	37	127	-	44	7,450
Housepit 7	4N48E	Unknown; 60(?) cm deep to 1 m deep	1.000	3	3	1	40	12	571	-	20	2,385
Structure A	12S-14S,59W-61W	3.5 cm diameter; 20-30 cm deep	0.900	32	6	-	1,073	322	1	-	74	39,020
Occupation Surface A	8S8E	Irregular; 20 cm deep	0.433	2	1	-	40	14	1	-	6	850
Occupation Surface B	10S6E	110x200 cm; 25 cm thick	0.683	403	15	-	3,652	683	7	3	410	124,248
Occupation Surface C	6-8S6E; 2S8E	100x150; 50x50 cm; 30 cm deep	0.717	100	4	1	2,572	741	1,640	-	143	12,789
Occupation Surface D	15S7E	1x2 m; 60 cm deep	0.900	229	7	-	1,099	234	63	-	38	4,060
Occupation Surface E	16S12E	200x90 cm; 25 cm thick	0.433	55	3	-	920	174	423	-	25	4,662
Occupation Surface F, Pit 1	16-18S12E	3x1 m; 25 cm thick	0.783	213	-	-	5,121	1,003	369	-	138	16,398
Occupation Surface G, Pit 2	5N30E	1x170 m; pit is 90x 55x 60 cm	0.700	54	4	-	695	126	257	-	37	2,792
Occupation Surface H	4S35E	1x2 m; 80 cm deep; 90 cm diameter	0.300	43	2	2	2,118	573	172	-	38	7,503
Pits 3 and 4	6S40E	Pit 3: 80 cm deep; 90 cm diameter Pit 4: 60 cm deep; 80 cm diameter	0.933	26	2	-	735	322	140	-	19	2,837
Occupation Surface I	6S40E	200x180 cm; 4 cm deep	0.400	14	2	-	51	19	66	-	10	510
Occupation Surface J	6S40E	140x140 cm; 10 cm deep	0.200	3	-	-	34	4	30	-	3	160
Occupation Surface K	6S40E	100x80 cm; 30 cm deep	0.150	10	-	-	42	39	105	-	7	1,080
Occupation Surface H, Pit 5	5S28W	1x2x20 cm thick; Pit 5: 25 cm thick and 50 cm diamter	0.575	107	4	-	297	50	-	-	30	24,995
Midden Surface M	15S26W	100x125 cm; 30 cm deep	0.425	415	21	-	19,067	3,715	4	-	369	37,552
Midden Surface N	6S37W	100x100 cm; 20 cm deep	0.250	45	2	3	322	305	824	-	119	18,154
Shell Concentration B	32S87W; 34S83W	10 cm thick	0.350	-	2	-	20	8	3,987	-	13	3,370

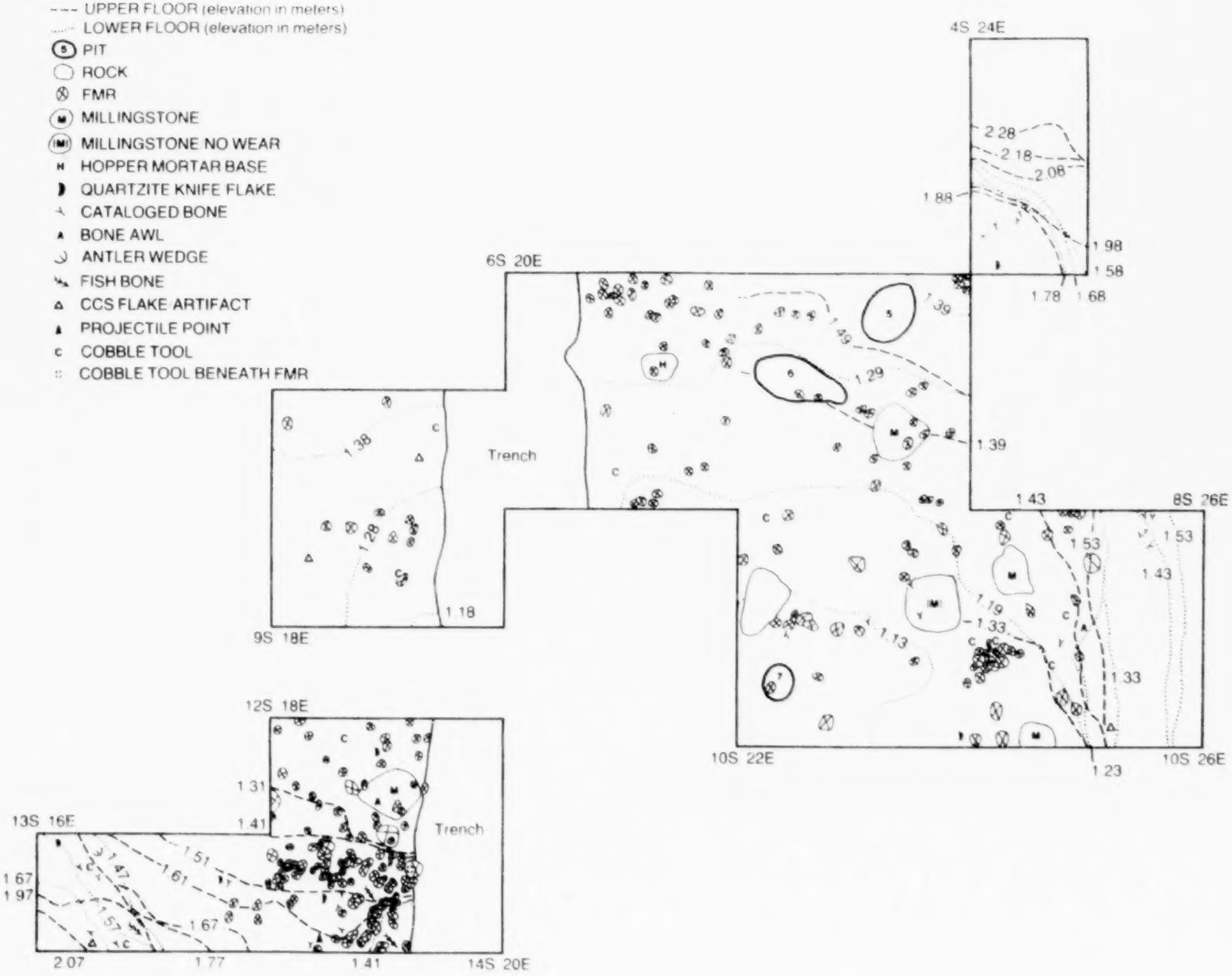
UPPER FLOOR (elevation in meters)
LOWER FLOOR (elevation in meters)
PIT
ROCK
FMR
MILLINGSTONE
MILLINGSTONE NO WEAR
HOPPER MORTAR BASE
QUARTZITE KNIFE FLAKE
CATALOGED BONE
BONE AWL
ANTLER WEDGE
FISH BONE
CCS FLAKE ARTIFACT
PROJECTILE POINT
COBBLE TOOL
COBBLE TOOL BENEATH FMR
4S 24E
6S 20E
8S 26E
9S 18E
10S 22E
10S 26E
12S 18E
13S 16E
14S 20E
Trench
Trench
2.28
2.18
2.08
1.88
1.98
1.58
1.78
1.68
1.39
1.49
1.29
1.39
1.38
1.28
1.18
1.43
1.53
1.53
1.43
1.19
1.33
1.13
1.33
1.23
1.31
1.41
1.51
1.61
1.47
1.57
1.67
1.67
1.97
2.07
1.77
1.41

Figure 6-16. Plan view, Housepit 2, 45-OK-4.

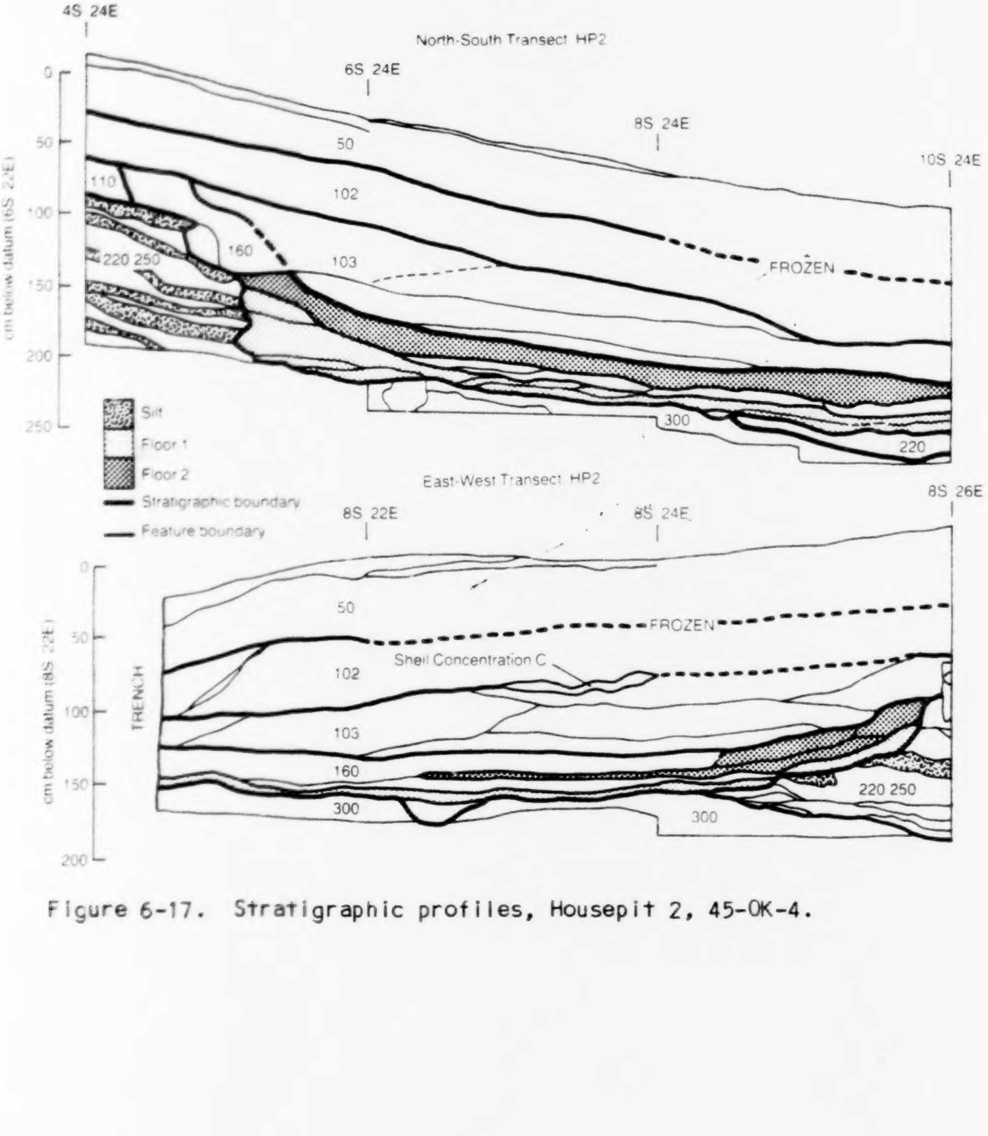
4S 24E
North-South Transect HP2
6S 24E
8S 24E
10S 24E
0
50
100
150
200
250
cm below datum (6S 22E)
110
50
102
103
160
220 250
FROZEN
300
220
Silt
Floor 1
Floor 2
Stratigraphic boundary
Feature boundary
East-West Transect HP2
8S 22E
8S 24E
8S 26E
0
50
100
150
200
cm below datum (8S 22E)
TRENCH
50
FROZEN
102
Shell Concentration C
103
160
300
300
220 250

Figure 6-17. Stratigraphic profiles, Housepit 2, 45-OK-4.

The fill of these last two pits is apparently living debris which was not deliberately dumped there. Since material occurs more frequently at the top of the pits, they must have filled in partially after the first occupation of the housepit and then continued to fill during subsequent occupation.

Floor 2, the upper floor, was distinguishable only near the rim of the pit. The separate floors are obscure at the center of the structure. This floor is separated from Floor 1 by 5 cm of silty fill (Figure 6-17). An irregular pattern of very heavy charcoal staining and bright-oxidized sand may indicate burning of a structure. Much of the bone taken from the floor was charred. Fish bone does occur, but not in the quantity seen on the lower floor. Density of material generally is not as great on Floor 2 as on Floor 1 (Table 6-13).

Table 6-14. Dimensions of interior pits, Housepits 2 and 5, 45-OK-4.

Pit	Dimensions (cm)	Depth below Floor (cm)
Housepit 2		
5	40 (diameter)	50
6	60 x 25	40
7	25 x 20	4
Housepit 5		
1	20 (diameter)	25
2	20 (diameter)	15
3	25 (diameter)	20
4	20 (diameter)	15

Housepit 5 (3085±114 B.P.)

Housepit 5 is the oldest structure at 45-OK-4, radiocarbon dated to 3085±114 B.P. (B-4756). It is circular, about 7 m in diameter (Figure 6-18), and 80 cm deep on the north (upslope) side. Its walls range from vertical (north side) to more moderately sloping (45-50° on the side). Stratigraphic profiles indicate two floors in immediate contact with each other in distinguishable during excavation. The lower floor, as seen in Figure 6-19, is a narrow band of dark charcoal stained sand and bone fragments, truncated in several places by the second floor, a thicker, more diffusely stained surface. The lower floor contacts a cobble/gravel stratum and incorporated some of the large intrusive rocks into the structure. A dense pavement of FMR and bone fragments was recorded among these boulders and a small (25 cm diameter) pit (Pit 1), thought to be a postmold. Several other pits were recorded by stratigraphic crews; their dimensions are recorded in Table 6-14, but their material contents were collected under the general floor designation (either Feature 23 or Feature 24).

Figures 6-18 and 6-20 show the location of pits within Housepit 5 and the provenience of stone tools. Because so little of the floor was exposed, however, we have not attempted to define activity areas.

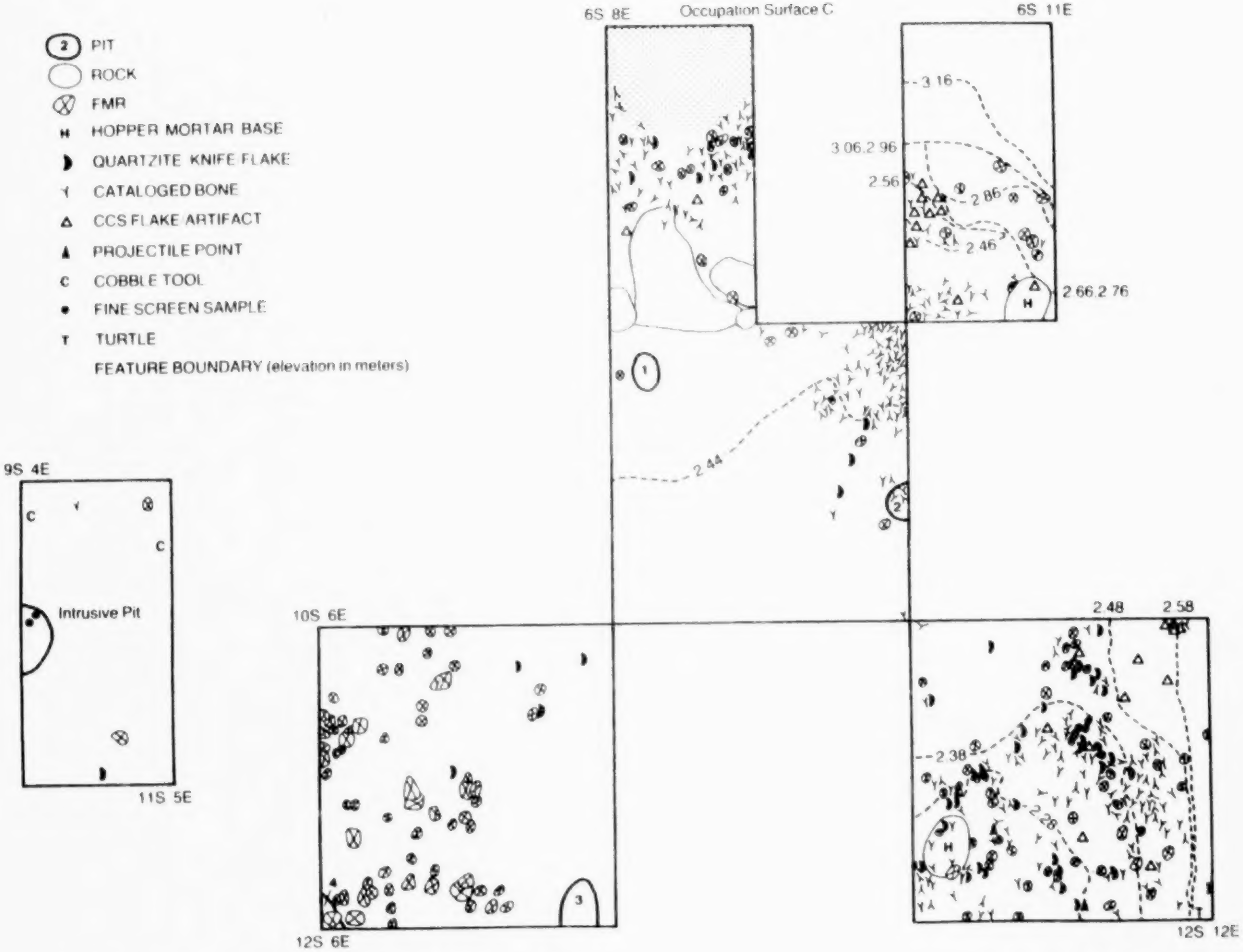
PIT
ROCK
FMR
HOPPER MORTAR BASE
QUARTZITE KNIFE FLAKE
CATALOGED BONE
CCS FLAKE ARTIFACT
PROJECTILE POINT
COBBLE TOOL
FINE SCREEN SAMPLE
TURTLE
FEATURE BOUNDARY (elevation in meters)
6S 8E
Occupation Surface C
6S 11E
3.16
3.06 2.96
2.56
2.86
2.46
2.66 2.76
H
1
2
2.44
9S 4E
C
C
Intrusive Pit
11S 5E
10S 6E
3
12S 6E
2.48
2.58
2.38
2.28
12S 12E

Figure 6-18. Plan view, Housepit 5, 45-OK-4.

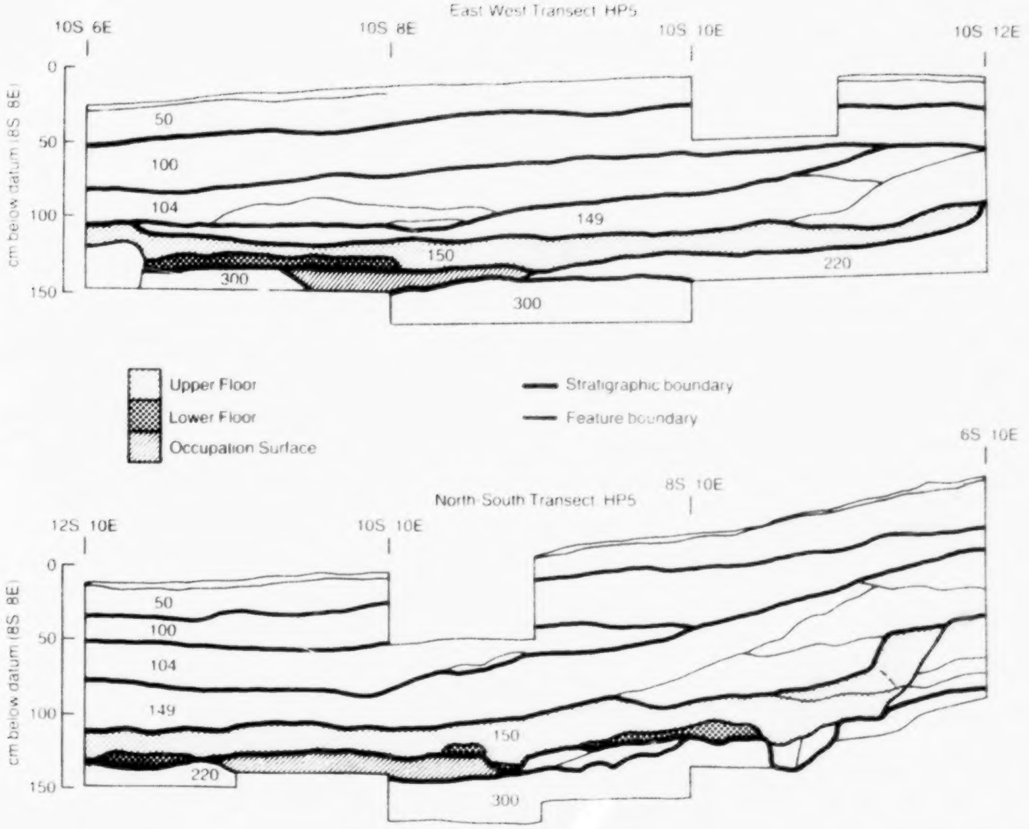
East West Transect HP5
10S 6E
10S 8E
10S 10E
10S 12E
0
50
100
150
cm below datum (8S 8E)
50
100
104
149
150
300
220
300
Upper Floor
Lower Floor
Occupation Surface
Stratigraphic boundary
Feature boundary
North South Transect HP5
12S 10E
10S 10E
8S 10E
6S 10E
0
50
100
150
cm below datum (8S 8E)
50
100
104
149
150
220
300

Figure 6-19. Stratigraphic profiles, Housepit 5, 45-OK-4.

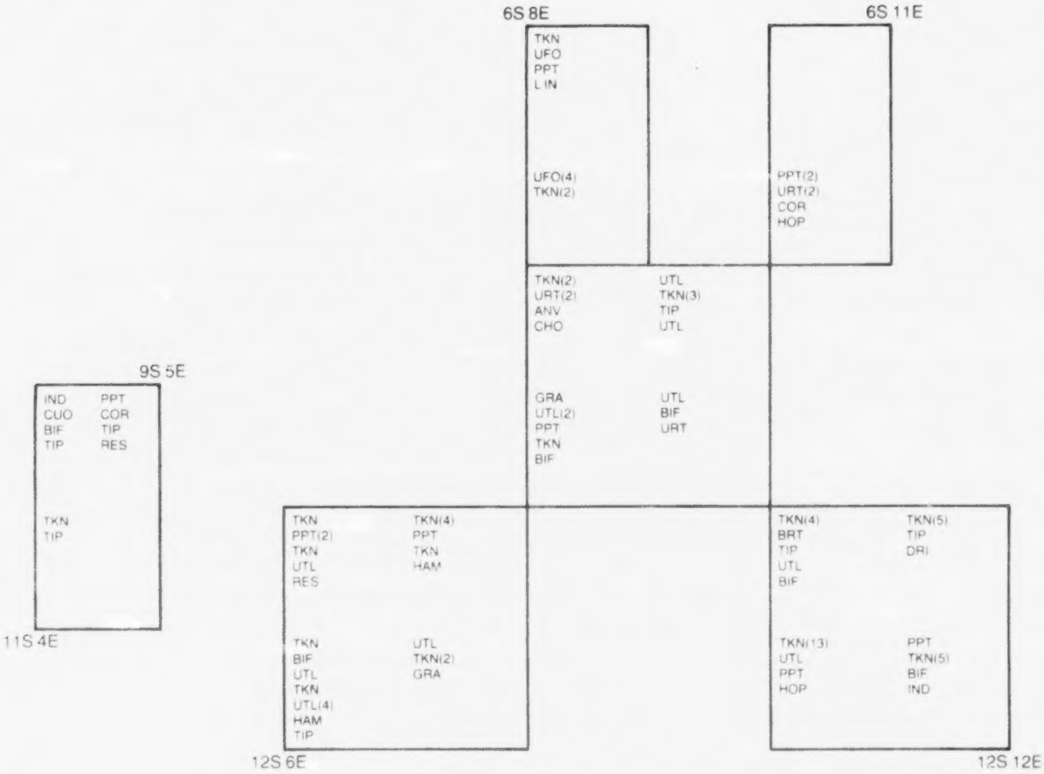
6S 8E
6S 11E
TKN
UFO
PPT
LIN
UFO(4)
TKN(2)
PPT(2)
URT(2)
COR
HOP
TKN(2)
URT(2)
ANV
CHO
UTL
TKN(3)
TIP
UTL
GRA
UTL(2)
PPT
TKN
BIF
UTL
BIF
URT
9S 5E
IND
CUO
BIF
TIP
PPT
COR
TIP
RES
TKN
TIP
11S 4E
TKN
PPT(2)
TKN
UTL
RES
TKN(4)
PPT
TKN
HAM
TKN
BIF
UTL
TKN
UTL(4)
HAM
TIP
UTL
TKN(2)
GRA
12S 6E
TKN(4)
BRT
TIP
UTL
BIF
TKN(5)
TIP
DRI
TKN(13)
UTL
PPT
HOP
PPT
TKN(5)
BIF
IND
12S 12E

Figure 6-20. Location of functional tool types in Housepit 5, 45-OK-4.

TKN = Tabular knife
UFO = Other formed bone object
PPT = Projectile point
LIN = Linear flake
URT = Unifacially retouched flake
COR = Core
HOP = Hopper morter
ANV = Anvil stone
CHO = Chopper
TIP = Projectile point tip
UTL = Utilization only
GRA = Graver
BIF = Biface
COR = Core
RES = Resharpening flake
HAM = Hammerstone
BRT = Bifacially retouched flake
DRI = Drill
HOP = Hopper morter

Housepit 6 (2438±145 B.P.)

Only a small portion of the northeast corner of Housepit 6 was exposed in 1S30E (Feature 20). It is a deep structure with vertical side walls. Stratigraphic profiles indicate that the aboriginal excavation extended 80 cm below the surface of origin, but that the first occupation is on a flat horizontal surface about 60 cm below the surface of origin (Figure 6-21). A carbon sample from that surface is dated to 2438±145 B.P. (B-4751). Although only five fish vertebrae were identified to species during faunal analysis (see Table 6-12 and Chapter 4), excavators state that the floor was "littered" with fish bone, counting over 250 fish bone and bone fragments in a 1 x 1 x 0.2 m area within the floor. Also distinctive within this housepit are the three beads of undetermined material and one dentalium shell. This association of beads and dentalium is repeated on the floor of Housepit 2, and may indicate a bone or shell working area or storage of decorative objects at the perimeters of the structure.

Housepit 7

The northern rim of Housepit 7 was exposed in 4N48E (Feature 28). No radiocarbon dates are available. The feature designation refers to both fill and floor. Shell dominates the upper portions of the fill, but decreases nearer the floor. Other material decreases with depth as well, indicating a fairly light occupation of the housepit. The absence of a compacted, burned, or darkly stained floor, as was found in the other housepits, supports this contention. Profiles indicate that the northern wall of Housepit 7 was either stepped, perhaps to create a more stable structure, or had been re-excavated (Figure 6-21). A similar situation is seen in the north wall of Housepit 2 (Figure 6-17).

Structure A (2360±134 B.P.)

A small structure of unknown function dated to 2360±134 B.P. was uncovered in three 1 x 2-m units in Area A of the site. Only about 4 m across, this is a very shallow structure (30 cm deep on the south side), with low gradually sloping walls (Figure 6-22). The slope and depth are a little greater on the north (upslope) side, but the walls never approach the depth or angle of the walls in the housepit recorded in Area B.

The floor of Structure A is a thick (10-15 cm) stratum, intensely stained by carbon and oxidization. The structure appears to have been burnt. A cluster of at least 45 FMR, more than half the FMR recorded in the whole feature, was uncovered near the southeastern rim.

Structure A represents a different kind of dwelling than the housepits at 45-OK-4. It is shallow, small, and contains evidence of a firepit; it does not contain other pits. No fish bone was identified. Structure A appears to have been a domestic structure--the variety of trash found within it does not

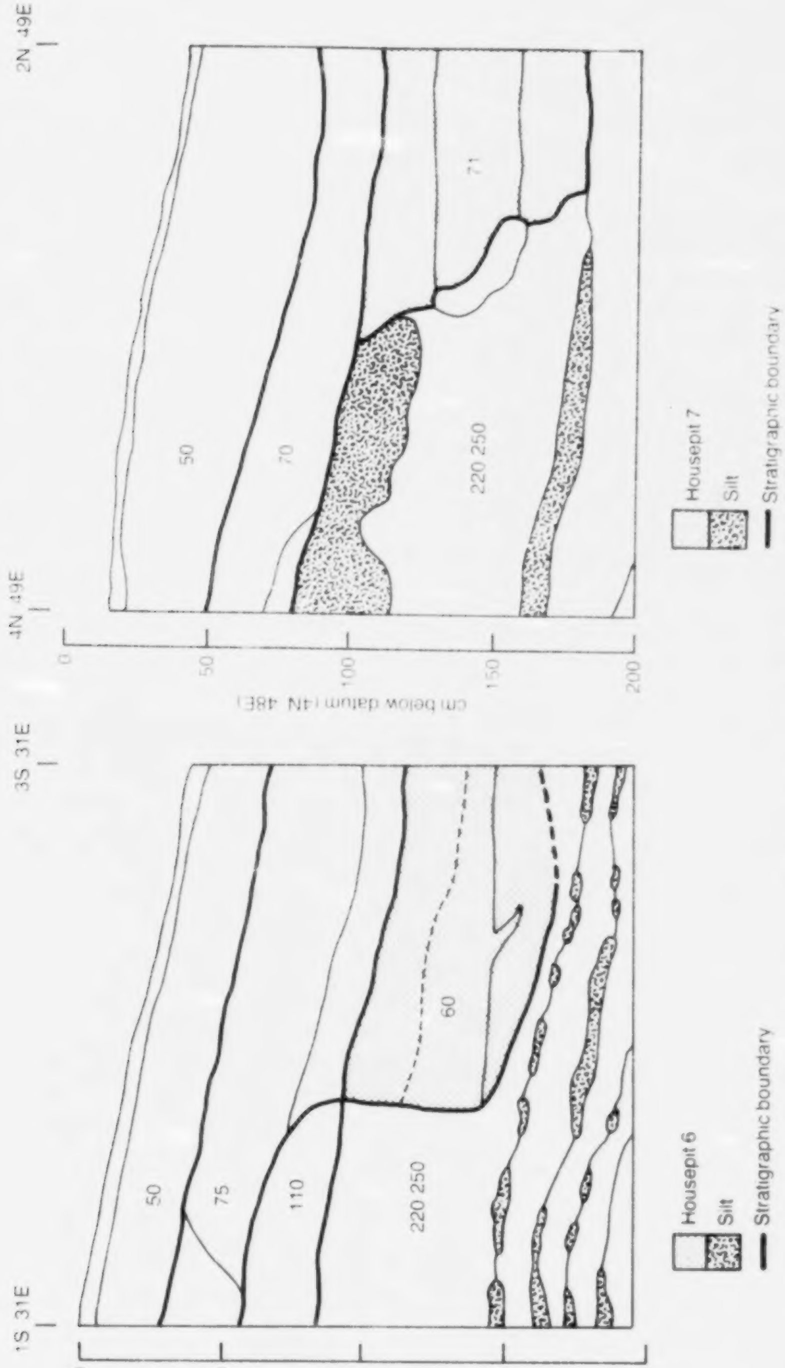
1S 31E
3S 31E
cm below datum (1S 30E)
0
50
100
150
200
50
75
110
220 250
60
Housepit 6
Silt
Stratigraphic boundary
4N 49E
2N 49E
cm below datum (4N 48E)
0
50
100
150
200
50
70
220 250
71
Housepit 7
Silt
Stratigraphic boundary

Figure 6-21. Stratigraphic profiles, Housepits 6 and 7, 45-OK-4.

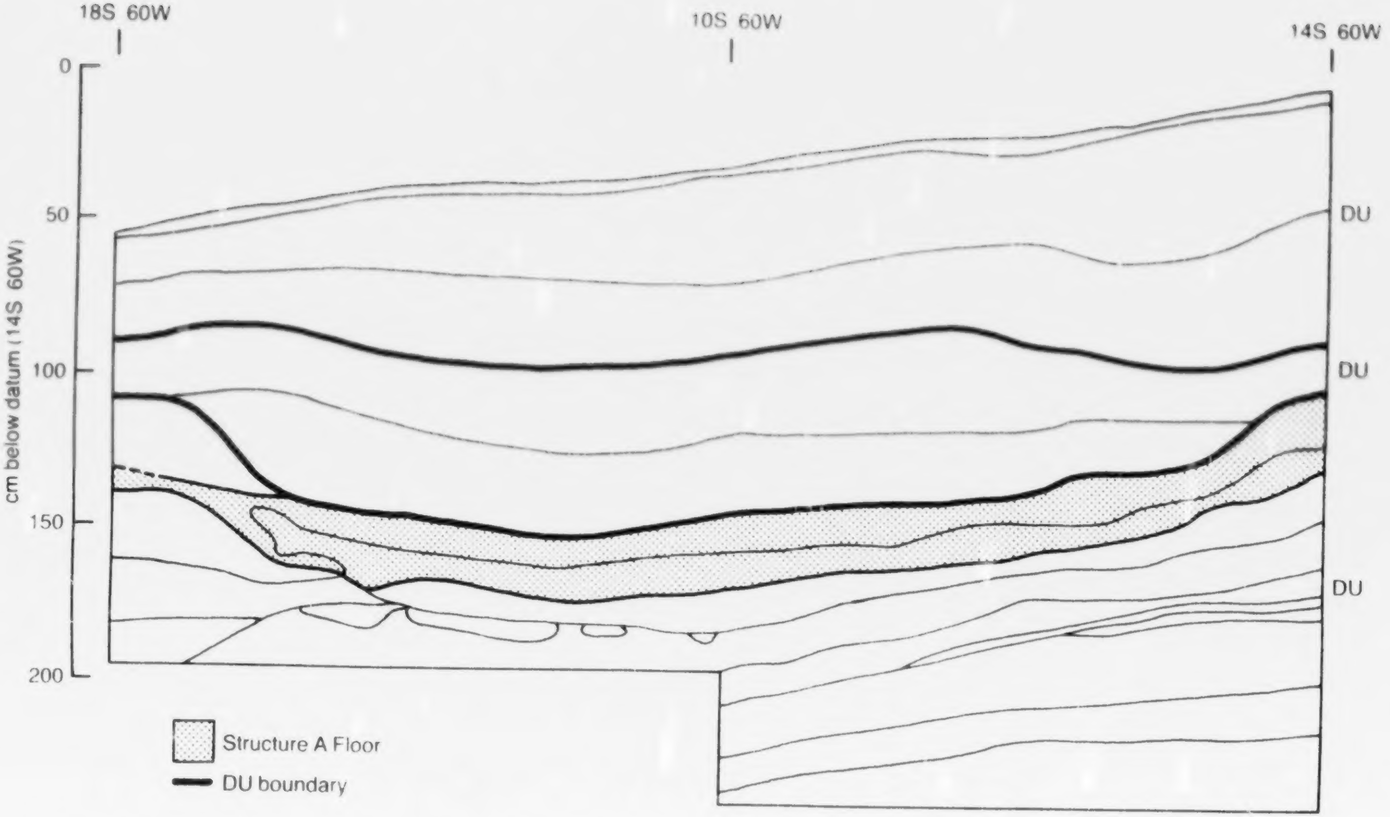
18S 60W
10S 60W
14S 60W
0
50
100
150
200
cm below datum (14S 60W)
DU
DU
DU
Structure A Floor
DU boundary

Figure 6-22. Stratigraphic profile, Structure A, 45-OK-4.

suggest a specialized function such as a sweat lodge or menstrual hut. It may represent either a different type of domestic group or a limited season of use.

Aside from the four housepits and Structure A, several other features were recorded in Zone 52 at 45-OK-4. Most are occupation surfaces of one kind or another; several may be pit structures. This discussion is organized horizontally in roughly a unit-by-unit fashion.

Occupation Surfaces A and B (Features 37, 35)

Occupations occur above and below Housepit 5. Discontinuous, irregular areas of charcoal staining and burnt soil occur just below the housepit floor in 8S8E (F37) (Figure 6-23). Little material was recovered from this feature; the projectile point noted in Table 6-11 is a Rabbit Island Stemmed B (M#886).

Immediately above the floor of Housepit 5 and within the confines of the housepit depression is Occupation Surface B (F35), a heavily stained matrix almost paved with FMR. This surface may be contemporaneous with Occupation Surface C. It represents repeated use of the housepit depression for exterior and possibly interior activities. The outline of Occupation Surface B in profile suggests a shallow, saucer-shaped structure, but without further horizontal exposure, the presence of a pit dwelling cannot be proven. Well over half of the 403 lithic waste flakes from Occupation Surface B were of opal; the density and predominance of a single lithic material suggest knapping was one activity carried on here.

Occupation Surface C (Features 11, 15)

Living surfaces were recorded in 2S8E and 6-8S8E which, because of their stratigraphic placement, slope, and horizontal proximity, we have judged to be a single feature. Occupation Surface C is a thick dark stratum that overlies the northwest corner of Housepit 5. In 2S8E, over 1,600 shell hinge pieces were incorporated within the matrix; only eight hinge pieces occurred in the feature in 6-8S8E. Shell counts decrease with depth in 2S8E suggesting that the shell is post occupational debris. Notable in both units was the amount of burned and unburned bone, including many fish bone (four vertebrae identified as salmon). A chipping station of "more than 40 greenish-brown cryptocrystalline chunks" was recorded in the field notes for square 6S8E. The profile presented in Figure 6-23 suggests exterior occupation surfaces for each of the cultural strata identified in Housepit 5. There is the possibility that the stratum labeled the "lower floor" represents use of the surface before construction of the housepit; we have evidence of a rim for this intermittent cultural layer.

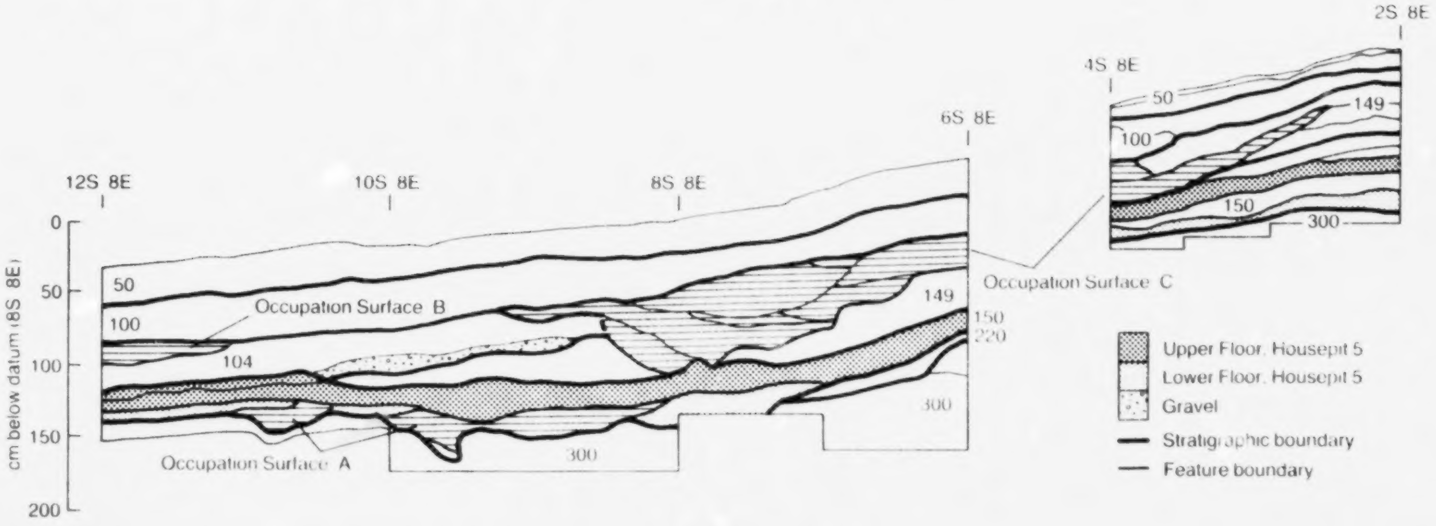
12S 8E
10S 8E
8S 8E
6S 8E
4S 8E
2S 8E
0
50
100
150
200
cm below datum (8S 8E)
50
100
104
149
150
220
300
300
Occupation Surface B
Occupation Surface A
Occupation Surface C
Upper Floor, Housepit 5
Lower Floor, Housepit 5
Gravel
Stratigraphic boundary
Feature boundary

Figure 6-23. Stratigraphic profile at 12S8E to 2S8E, 45-OK-4.

Occupation Surface D (Feature 14)

Another living surface occupies a pit noted in the profiles of 15S7E. This pit is a bowl-shape in profile in that the wall (35 cm high) is steeply sloping, and the floor itself slopes down another 20 cm. The floor of the pit is a mottled orange/brown sand, not marked by heavy staining or oxidized soil. Since many of the bone fragments recovered were charred, we must assume that the charring results from processing, not from post-abandonment conflagration.

Occupation Surfaces E and F; Pit 1

Several excavation units were opened up in the area south of and between Housepits 5 and 2. Several interbedding cultural strata were recorded in this area. Some may represent actual living surfaces, but we suspect that some may be backdirt from the re-excavation or modification of one or both housepits. Inversion of radiocarbon dates and earlier dates than we might expect leads us to believe that some of the deposits in this area are secondary.

Occupation Surface E (Feature 45) is a 20-cm thick cultural stratum which follows natural surface contours south toward the river. Neither cultural material (Table 6-13) nor staining (Figure 6-21) is very dense. Occupation Surface E is the first evidence of cultural activity in this area; since it originates immediately above DU II, we postulate that it is nearly contemporaneous with Housepit 5. Pit 1 originates within this surface. Its fill consists primarily of slumped and interbedded cultural strata. Unfortunately, Pit 1 and Occupation Surface E were recorded as a single feature, so that we cannot distinguish between the material contents of each.

Occupation Surface F (Feature 25) is separated from Occupation Surface E by 10-15 cm of unstained sand and clearly originates above it (Figure 6-24). It seems to be part of an FMR concentration which blankets the western portions of the three excavation units in this area. A radiocarbon date of 3180±90 B.P. (B-4755) was taken from within this FMR stratum; another radiocarbon date of 2825±86 B.P. (B-4753) was taken from just above Occupation Surface F where it lies above Pit 1. The earlier date is higher stratigraphically than the later one, and the later one is earlier than we would expect, since Occupation Surface F and the FMR concentration seem to be stratigraphically correlated with the occupation of Housepit 2, dated to 2097 B.P. Therefore, we postulate that many of the lenses of cultural material represented by Pit 1 and Occupation Surface E and F may represent debris or backdirt from the re-excavation or cleaning of either Housepit 5 or Housepit 2.

Occupation Surface G and Pit 2 (Feature 22)

A dark, carbon stained surface was recorded in 5N30E. A 170 x 95 cm area of dark gray staining and FMR may mark the main section of the floor. Little piles of fish bone on the surface were noted. Pit 2 began in the northeast corner of the unit, immediately below the floor. The number of fish bone

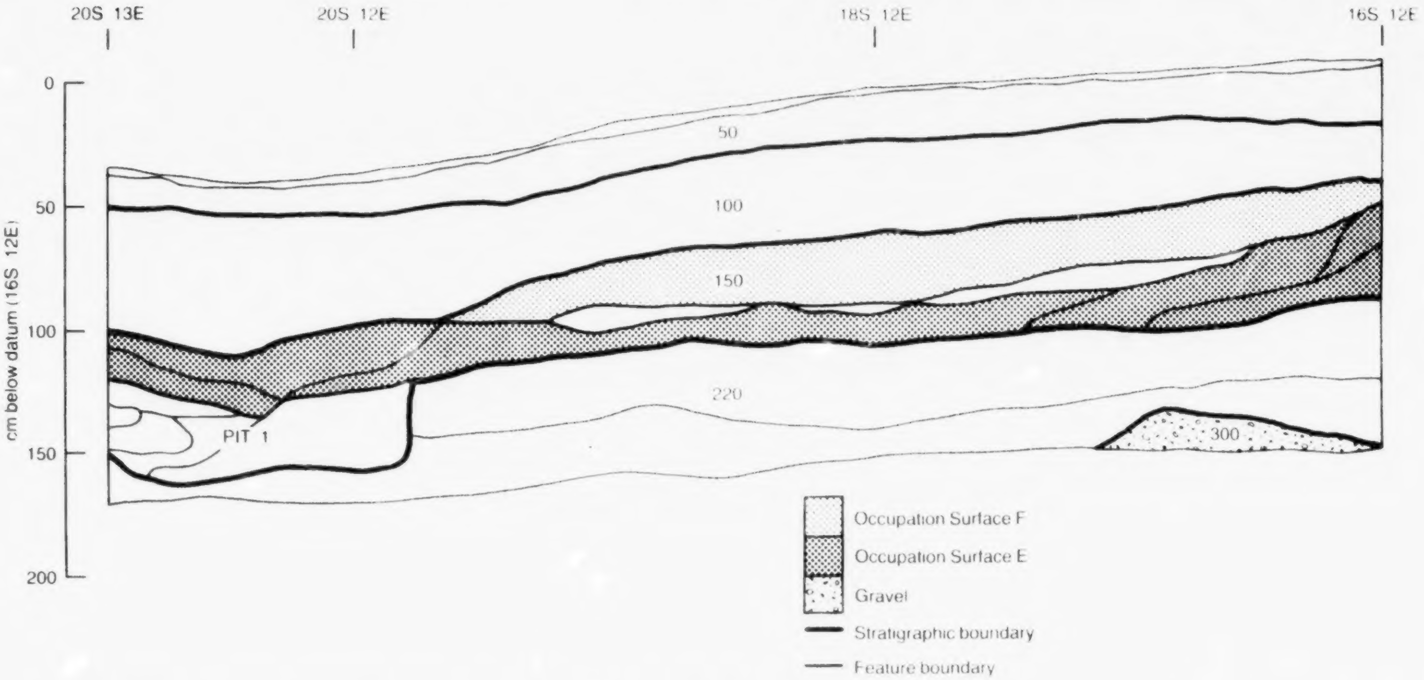
20S 13E
20S 12E
18S 12E
16S 12E
0
50
100
150
200
cm below datum (16S 12E)
50
100
150
220
300
PIT 1
Occupation Surface F
Occupation Surface E
Gravel
Stratigraphic boundary
Feature boundary

Figure 6-24. Stratigraphic profile at 20S12E to 16S12E, 45-OK-4.

increased in the pit, while counts of other material declined. Fish bone, some of it burnt, was recorded in all levels of the pit, but the numbers increased in the last 30 cm. Our faunal analysis has identified only 28 salmon vertebrae; excavators cataloged 86 "fish ribs" in the last three levels of Pit 2. The presence of fish bone is quite common in the other housepits at 45-OK-4; its presence suggests Occupation Surface G may be a dwelling floor.

Occupation Surface H (Feature 19)

Occupation Surface H also resembles a pit structure. On plan maps made during excavation, the feature is shown to lie in a depression 40-50 cm deep with vertical walls on the west side. The profile, which is of the east wall, reveals little about the occupation; there is nothing to suggest a pit structure. However, the material contents are similar to housepit depressions; that is, there is a brown sandy matrix lying within a sterile yellow sand. This brown fill contains much shell (the shell is not indicated in Table 6-13 since these levels were not designated features). Below the shell-laden fill is a black and red mottled surface. This floor, which lies just above the coarse yellow sand, consists of a "pavement" of bone and FMR on charcoal-stained, compacted sand. Excavators record "100's and 100's of mostly fish bone, a deer jaw," and "...clumps and clusters and heavy concentrations" of fish bone. Two articulated fish skeletons were recorded. Salmon, represented by 61 elements (Table 6-12) is the only species of fish identified. Of the eight deer bone identified in Table 6-12, several articulate as a single set of jaw and teeth; the eighth is a worked bone artifact.

Occupation Surfaces I, J, K, Pits 3 and 4

The 2 x 2-m excavation unit, 6S40E, was intended to test Housepit 1, a surface depression noted prior to excavation. No housepit was uncovered, but two superimposed deep pits and three overlying occupational strata were recorded (Figure 6-25). None of these appear to have any connection with Occupation Surface H, just 5 m to the west. All but one of the features in 6S40E have well defined rims on the west side.

Figure 6-25 shows the sequence of occupation very clearly. First are Pits 3 and 4 (both recorded as Feature 41). Pit 3, the oldest, is 80 cm across and 80 cm deep. It is a straight-sided, flat-bottomed pit. The bottom 25 cm of Pit 3 contains a heap of charcoal stained soil and "lots" of fish bone are noted in the field records. Directly above, a second dumping episode is represented by 11 FMR with charcoal and carbon-stained soil. A final cultural layer, consisting of oxidized, orange sand and more fish bone, caps the pit. It may represent a third disposal or an occupation after Pit 3, but predating Pit 4.

Pit 4 was excavated into Pit 3. It is 90 cm in diameter and 80 cm deep. Its fill, a light gray compacted silt was churned by rodent activity. Little staining is recorded in Pit 4 and it appears, from profiles and excavation

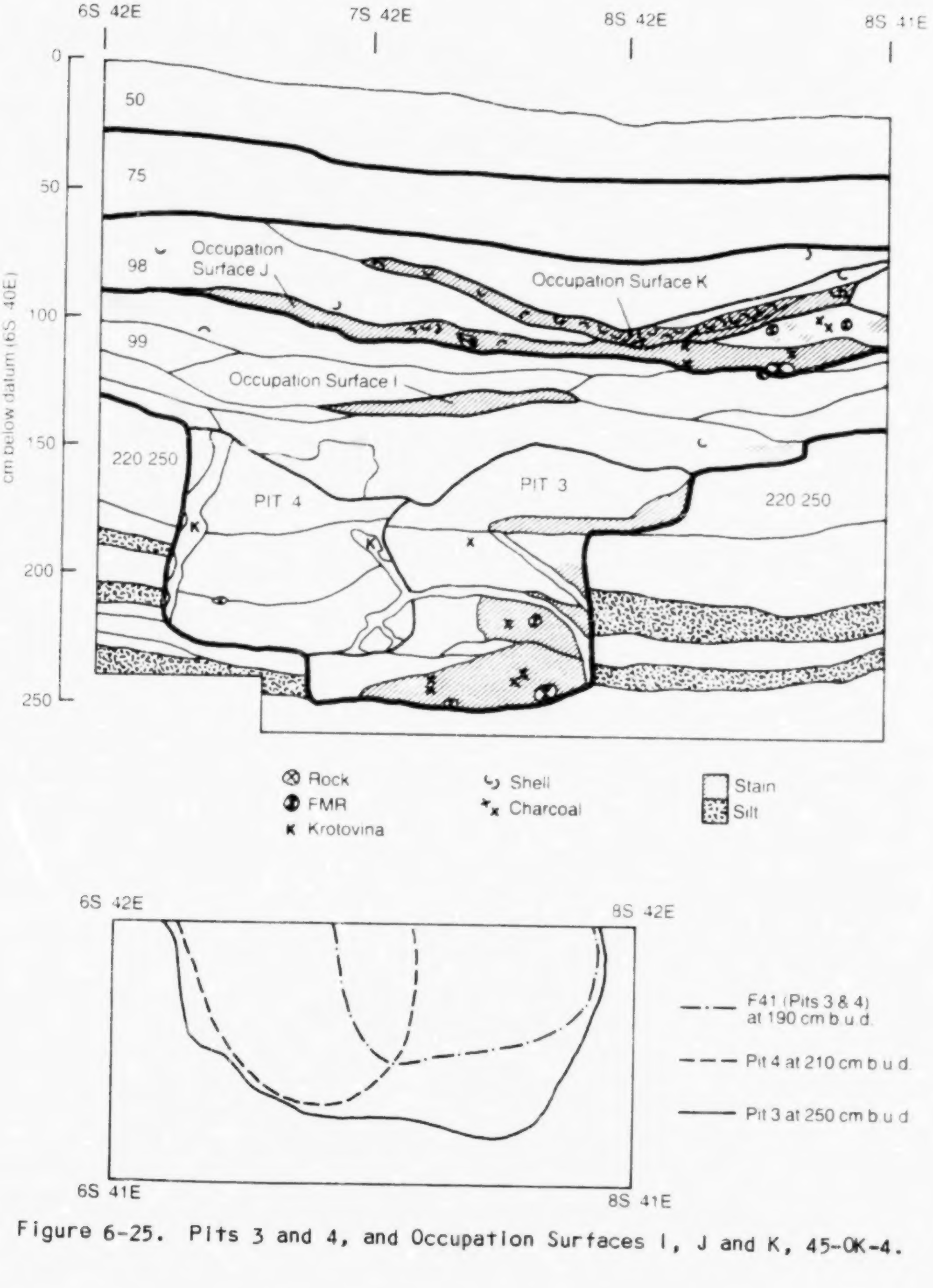
6S 42E
7S 42E
8S 42E
8S 41E
0
50
100
150
200
250
cm below datum (6S 40E)
50
75
98
99
Occupation Surface J
Occupation Surface K
Occupation Surface I
220 250
PIT 4
PIT 3
220 250
K
K
Rock
FMR
Krotovina
Shell
Charcoal
Stain
Silt
6S 42E
8S 42E
6S 41E
8S 41E
F41 (Pits 3 & 4) at 190 cm b.u.d.
Pit 4 at 210 cm b.u.d.
Pit 3 at 250 cm b.u.d.

Figure 6-25. Pits 3 and 4, and Occupation Surfaces I, J and K, 45-OK-4.

records, that the bulk of material recorded as Feature 41 comes from Pit 3. A radiocarbon sample from Pit 4, however, has been dated to 2845±121 B.P. (B-4754).

Occupation Surface I (F4) is a charcoal-stained compacted silt which slopes from northwest to southeast across the unit. It can be seen in the profile as a thin (about 5 cm) stratum.

Occupation Surface J (F38) is a flat surface about 10-15 cm thick. Its matrix is a charcoal flecked, sandy tan silt containing very little cultural material. It covered the southeast quarter of the unit in an arcing pattern with a radius of 140 cm.

Occupation Surface K (F36) lies in a 30 cm-deep depression, the area exposed was 80 to 100 cm on a side. The walls of the depression slope gradually, outlining a deep saucer shape. The floor consisted of a shell-laden, organically stained matrix, overlying a thin layer of burned earth. The shell apparently were not charred and may be post-occupational debris.

Occupational Surface L and Pit 5 (Feature 2)

In the western half of the site, Area A, a thick occupation surface was recorded in 5S28W. Ranging from 12 to 30 cm thick, this is a darkly stained silt matrix near the south end of the unit; more diffuse staining occurs on the north side. Pit 5, on the west wall, is 50 cm in diameter and 25 cm deep. It was packed with small FMR and charcoal.

Dumps and Shell Concentrations

South of Occupation Surface L is a dumping area, Midden Surface M (F12), which dates to 2895±94 B.P. We infer this function because of the feature's irregular vertical boundaries and from the fact that the debris occurred in pockets or clumps of material. Excavators noted that, while the FMR appears to be distributed randomly and ubiquitously, bone fragments tended to occur in small clusters associated with definable pockets of charcoal. This feature slopes to the south, following natural contours.

Radiocarbon dates indicate Midden Surface M predates Structure A. However, since several samples were combined to obtain the date from the dump and since the feature represents secondary deposits, the date of nearly 2900 B.P. is not as reliable as others from the site.

Midden Surface N (F10) also may be a dump. Its mottled soil, clusters and concentrations of debris, and mounded appearance, suggest that it is more like a classic midden. The midden is 24 cm high at its center in the northwest corner of the unit, gradually tapering out along the west and east walls. Shell and FMR are the major constituents of the feature.

A shell stratum was recorded on the far west edge of the site (Shell Concentration B, F4,5). This is a 10-cm thick layer of burned and unburned shell in an organically stained matrix. The burned, fragmented shell lies above the unburned, often whole shell which makes up the bottom 5-8 cm of the shell layer. The feature slopes south following natural contours.

ZONE 51

Very few cultural features are recorded in Zone 51 (Table 6-15): there are two shell concentrations and two firepits. Their locations are shown in Figure 6-26.

In Area B, a shallow shell-filled depression (Shell Concentration C, F26) was recorded above the Housepit 2 fill (Figure 6-17). The depression was only 10-15 dm deep, and the shell within it lay about 10-12 cm thick. The loamy sand matrix was essentially the same as that encountered in the preceding levels, although it was slightly mottled with organic staining.

Just west of this shell midden is a small, round firepit, about 50 cm in diameter and 10 cm deep. Eighteen FMR (at 7220 g) were collected from Firepit 1 (Figure 6-27), but since it was not featured separately in the field, more detailed identification of its contents cannot be made. At the base of the FMR was a compacted area of stained and burned sand. A radiocarbon sample yielded a date of 670±63 B.P.

Firepit 2 (F3) in Area A is similar to the one in Area B. Approximately 50 cm across, this pit is 20-25 cm deep (Figure 6-27). No charcoal staining or oxidized soil was associated. Twice as many FMR, one-third again as large, occur in Firepit 2 as in Firepit 1. No other material was collected as part of this feature.

Shell Concentration B (Feature 1) is a thin, sloping shell layer in 28S68W. No staining or other material was noted.

CONCLUSIONS

45-OK-250 and 45-OK-4 appear to have evidence of slightly different activities. These differences are not apparent in either a listing of feature types nor a superficial examination of material contents. Housepits with interior features, exterior living surface, middens, shell concentrations, and the like all occur at both sites (Table 6-16). Differences between the number of housepits and occupation surfaces at 45-OK-4 and 45-OK-250 result from the many reoccupations of the former. For example, Housepit 2 at 45-OK-4 has at least 3 floors from several, partially overlapping structures. Housepit 5 is overlaid by at least one exterior living surface. Pits 3 and 4 are also succeeded by several distinct surfaces. Re-use at 45-OK-250 is indicated primarily by the separate strata in the dump, but not in a complex layering of activity surfaces such as was found at 45-OK-4.

That the two sites may have played different roles in the Hudnut Phase economy is suggested by the differential distribution of salmon remains. At 45-OK-250, 15 salmon vertebrae were identified on the floor of Housepit 1; Occupation Surface 4 also yielded some salmon bone. Salmon remains are identified in most features at 45-OK-4, however, and field notes often remark on the number of fish ribs and vertebrae in the units. The lower floor of Housepit 2 and several of the postulated shallow dwellings, in particular, contain abundant fish remains.

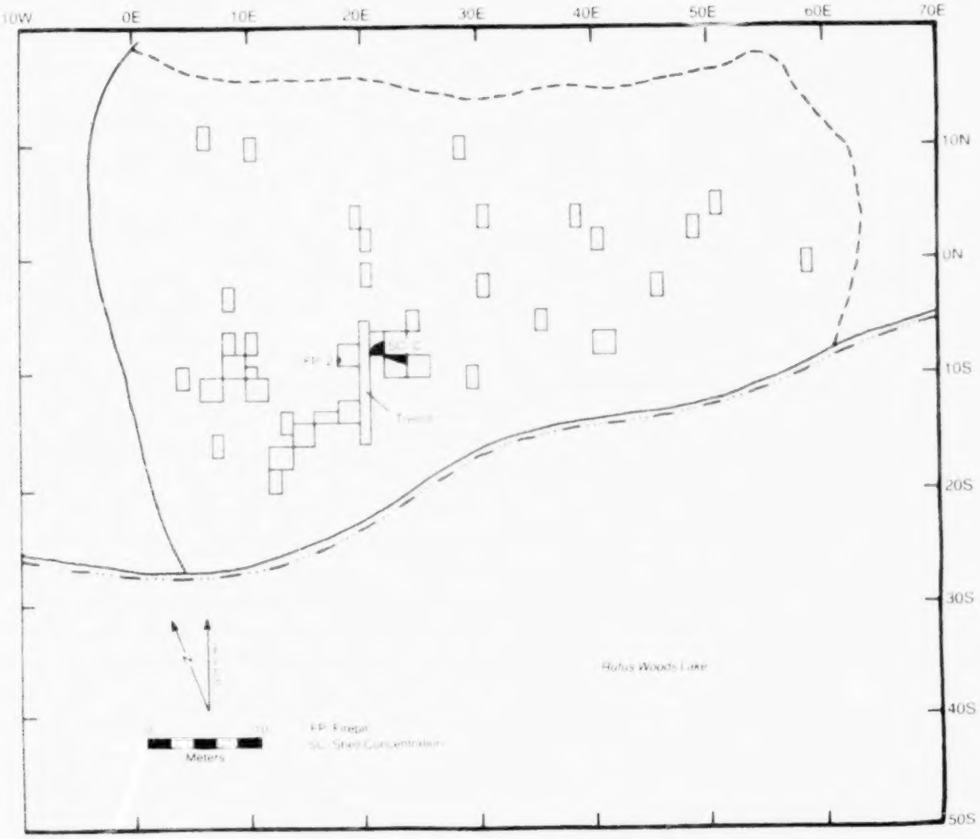
10W
0E
10E
20E
30E
40E
50E
60E
70E
10N
0N
10S
20S
30S
40S
50S
FP 2
SC 2
Trench
Rufus Woods Lake
0
10
Meters
FP: Firepit
SC: Shell Concentration

Figure 6-26. Location of features, Zone 51, 45-OK-4.

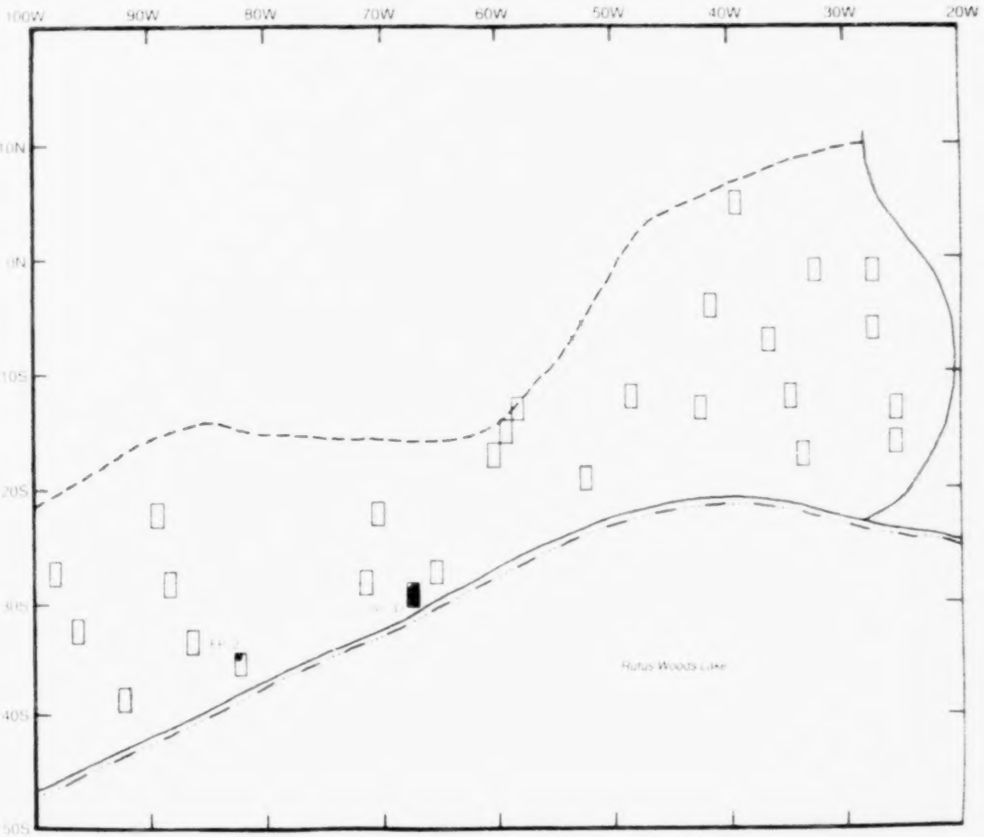
100W
90W
80W
70W
60W
50W
40W
30W
20W
10N
0N
10S
20S
30S
40S
50S
Rufus Woods Lake

Figure 6-26. Cont'd.

Table 6-15. Dimensions, provenience and contents of features, Zone 51, 45-OK-4.

Feature	Provenience	Dimensions	Estimated Excavated Vol. (m^3)	Lithic Debitage	Tools		Bone		Shell		FMR	
					Stone	Bone	#	wt (g)	#	w (g)	#	wt (g)
Shell Concentration C	6-8S22E	120x300 cm; 10-15 cm thick	0.183	3	-	-	15	1	849	1	4	18
Firepit 1	7S18E	50x50 cm; 10 cm thick	none	-	-	-		-	-	-	-	-
Firepit 2	34S83W	60x60 cm; 20 cm thick	0.150	-	-	-	-	-	-	-	38	23,380
Shell Concentration D	28S68W	100x50 cm; 15 cm thick	0.100	-	-	-	-	-	210	-	1	50

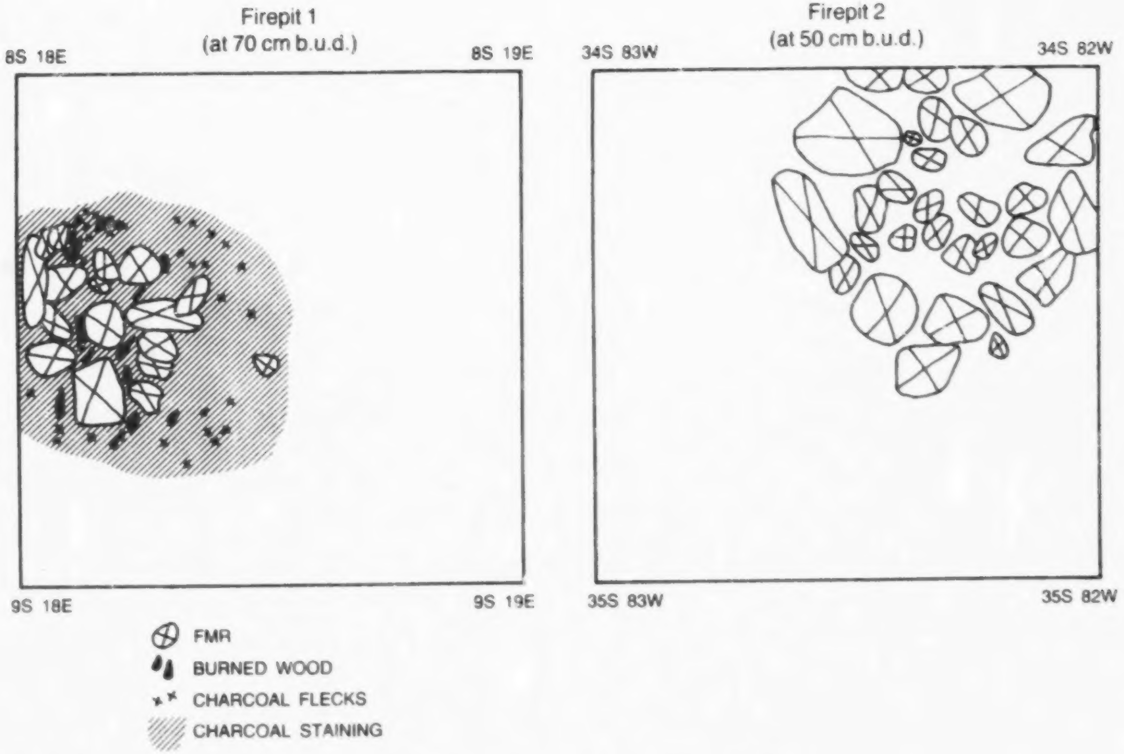
Firepit 1
(at 70 cm b.u.d.)
8S 18E
8S 19E
9S 18E
9S 19E
Firepit 2
(at 50 cm b.u.d.)
34S 83W
34S 82W
35S 83W
35S 82W
FMR
BURNED WOOD
CHARCOAL FLECKS
CHARCOAL STAINING

Figure 6-27. Plan views, Firepits 1 and 2, Zone 51, 45-OK-4.

Table 6-16. Feature types by site and zone, 45-OK-250 and 45-OK-4.

Feature Type	Zone					
	51		52		53	
	45-OK-250	45-OK-4	45-OK-250	45-OK-4	45-OK-250	45-OK-4
Housepits	-	-	2[1]	5	-	-
Interior Pits	-	-	1	8[2]	-	-
Postmolds	-	-	15	?	-	-
Occupation Surfaces	1	-	2	10	-	1
Midden Surfaces	3	-	3	2	1	-
Bone Concentrations	-	-	2	-	1	-
Shell Concentrations	1	2	4	1	1	1
FMR Concentrations	3	-	1	-	-	-
Stains	-	-	-	-	4	-
Exterior Firepits	-	2	2	-	1	-
Exterior Pits	1	-	2	4	-	-

[1] Two early occupations—possibly structures—had been truncated by Housepit 1.

[2] Some of these may be postmolds.

THE HUDNUT PHASE

Occupations at both sites fall into the Hudnut Phase (2000-4000 B.P.), with less evidence of use during either the preceding Kartar Phase, or the later Coyote Creek phase. As such, these two sites offer excellent examples of Hudnut features, especially of housepits. A brief comparison with 45-OK-11, a Kartar Phase housepit site (Lohse 1984f) indicates some attributes which may be diagnostic of the Hudnut Phase. Size and depth of housepits seems to be dependent upon local factors of slope and soil rather than temporally diagnostic. At 45-OK-11, a great deal of variation was observed in structure size and depth, and the same is true for any Hudnut site at which several housepits are recorded (e.g., 45-OK-258, 45-DO-242, and 45-DO-211). Shape may be a distinctive attribute: the housepits at 45-OK-250 and 45-OK-4 are basically round or oval, while those at 45-OK-11 are curvilinear--straight sided with rounded corners. The presence of postmolds and well-defined interior pits also appears to mark the Hudnut Phase. Housepit 1 at 45-OK-250 contaned molds of 13 posts, and Housepits 2 and 5 at 45-OK-4 produced a total of eight interior pits. Some of these may be postmolds. Postmolds and/or interior pits are recorded in number at the Hudnut housepit sites of 45-DO-211 and 45-OK-258 as well. By contrast, only two possible postmolds and a few small, poorly defined interior pits were uncovered in the housepits of 45-OK-11. Conversely, interior firepits occur in the Kartar Phase housepits, but either were not constructed or not preserved in the Hudnut Phase.

These are some of the formal differences between the Hudnut Phase housepits and those recorded at 45-OK-11, a Kartar Phase site. The cultural features at 45-OK-250 and 45-OK-4 do not differ from earlier features much in form, type, or quantity, but when taken together, indicate qualitative cultural change.

7. SYNTHESIS

This chapter summarizes and integrates the information presented in the previous chapters. The following sections describe geological, chronological, faunal, botanical, and seasonality data in relation to the project area and Plateau archaeological record. The emphasis throughout is on the Hudnut Phase characteristics of the sites.

Sites 45-OK-250 and 45-OK-4 are on a narrow terrace remnant at the foot of the slope to the 1,000 ft terrace. The slope, the river, and the wind have provided the major deposition and disruptions at the sites: colluvial slope wash, ephemeral drainage channels, river overbank and aeolian deposits. All of the zones are associated with matrix above basal river gravel and cobble bar or alluvial fan deposits (DU I).

The cultural analytic zones at each site are associated with similar depositional units. Zone 53 is associated with the laminated sands and silts of DU II and includes cultural material found at the interface of DU I and DU III in those areas where overbank deposits do not occur. Zone 52 is associated with DU III and DU IV, sediments that are primarily laterally accreted slope wash affected to varying degrees by ephemeral drainages, and distinguished from one another by a greater contribution from aeolian processes in DU IV. Zone 51 is associated with DU V which includes moderately well sorted aeolian sediments and the surface litter layer. The zones are not directly equivalent at each site (Figure 2-15). The zones have been defined in order to isolate the Hudnut Phase Zone 52 component at each site.

Zone 53 at 45-OK-250 is represented by a single radiocarbon date of 4448±123 B.P. from a stratigraphically complex location. Zone 53 at 45-OK-4 yielded a radiocarbon date of 3630±113 B.P. The small number of projectile points from each zone does not aid us in limiting their ages (Figure 3-25). Rabbit Island stemmed forms are accompanied by two Cascade points. There is the suggestion of Kartar age material, primarily from 45-OK-4, in the appearance of more basalt and a small collection of carbonate coated artifacts recovered from a deeply excavated unit. There are, in any case, few structured cultural remains from the zone at either site. We assign Zone 53 a pre-3800 B.P. age estimate at 45-OK-250. At 45-OK-4 Zone 53 pre-dates at least 3300 B.P. We regard both as a mixture of Kartar and Hudnut Phase elements.

Zone 52 yielded 16 radiocarbon dates from housepits and other cultural features at each site ranging from about 3800 to 2000 B.P. The zones are chronologically sequential. 45-OK-250 approximates the earlier period from 3800 to 2800 B.P. and 45-OK-4 the later period from 3300-2000 B.P. with some overlap of dates between the sites (Figure 2-15). The projectile point assemblage is dominated by Rabbit Island stemmed forms in this and the succeeding zone at each site. Zone 52 provides a firmly dated context for these points as well as suggesting temporal variation among the three variants. The Rabbit Island B style is more frequent in the earlier assemblage at 45-OK-250 while the Nespelem Bar variant is more common in the later 45-OK-4 collection.

Age estimates for Zone 51 are based on projectile points and a single radiocarbon date of 670±63 B.P. from 45-OK-4. The appearance of Quilomene Bar forms supports a lower age estimate of at least 2500 B.P. at 45-OK-250. The continued prominence of Rabbit Island stemmed forms and the low frequency of more recent styles suggest the zone primarily represents the early part of the Coyote Creek Phase from 2000 to 1500 B.P. We extend the age estimates to 1000 B.P. at 45-OK-250 and the protohistoric 45-OK-4 to accomodate the radiocarbon date and the few more recent projectile point styles.

Faunal material makes up the largest proportion of each zone assemblage at both sites (Table 2-3 and 2-4). The terrestrial faunal taxa identified include species known from the ethnographic record to have been important sources of meat, hides and bone (Table 4-1). There is general correspondence of species among the zones and between the sites. Deer are the major economic fauna followed by mountain sheep. Salmon occur in all zones. 45-OK-4 has more identifiable bone and more individuals identified in Zone 52. It also has the greatest number of salmon remains. The most interesting contrast is the greater proportion of shell at 45-OK-250 in Zone 52. That this is not an artifact of sampling between the sites is demonstrated by reviewing the zone distribution maps (Figures 2-12 and 2-13) which show sampling of interior and exterior areas is similar in proportion at the two sites. Nor is it a matter of excavation volumes. Shell density is much greater at 45-OK-250 (313.3/m^3) than at 45-OK-4 (179.9/m^3). Density figures also show differences for bone (45-OK-250 - 1044.9/m^3; 45-OK-4 - 1876.5/m^3).

The botanical analysis is limited to samples from 45-OK-250. The presence of species useful for food, tools and fuel, primarily from Zone 52 was demonstrated. Of great interest is the array of edible species, goosefoot, hawthorn, chokecherry, serviceberry, camas, lomatium and sunflower. All but the goosefoot have been reported as food resources in the ethnographic literature. If consumed as fresh foods, they are seasonal indicators of summer to fall occupation. However, each of these species may be processed and stored for winter use. In at least one case, the hawthorn, the seeds are crushed, a likely result of drying and pounding for formation into cakes or mixing with meats for storage.

The feature analysis has identified pits, occupation surfaces, midden surfaces, debris scatters, and structures. Most were identified in Zone 52 (Table 6-16). 45-OK-4 shows more evidence of continuous or repeated occupation in complex layering of activity surfaces and multiple structure floors. Formal characteristics of the structures at both sites include round to oval outline, interior pits, and lack of structural central hearths.

INTERSITE VARIATION

We hesitate to over-emphasize the contrasts between the sites in Zone 52. However, consideration of the data suggests a subtle difference between the two for which a number of explanations can be suggested. We must emphasize that we search for contrast in our data and are most likely over simplifying the evidence of complex cultural deposits and poorly understood human behavior. Differences between the sites have been noted throughout the faunal and in the artifact and feature analyses. The contrasts in bone and shell density, distribution of terrestrial economic species and salmon remains, the botanical information and the lithic artifacts can all be construed to represent differences between the sites with seasonal, chronological or functional implications.

Our major point of departure for this discussion requires that we accept several premises. First, that shellfish were consumed primarily in the late winter/early spring as described in ethnographies (Ray 1932:58). Second, salmon vertebrae indicate the presence of fresh fish rather than stored. Crushed salmon vertebrae, whose recovery using 1/8" screens is unlikely, might best suggest storage. The separation of lithic debitage from other material in the contents of Pit 16 (F121) in Housepit 1, 45-OK-250, revealed numerous very small bone fragments, some identifiable as fish. Salmon vertebrae are more numerous at 45-OK-4 and the field notation of fish "ribs and spines" as well as the recovery of articulated skeletons suggest fresh fish. Finally, the botanical evidence from 45-OK-250 indicates winter foods.

We can then suggest that the Zone 52 occupation at 45-OK-250 represents primarily winter village use in the classic ethnographic sense. In contrast, the 45-OK-4 Zone 52 assemblage represents summer and fall use as indicated by the salmon remains. At both sites, hunting is a major economic pursuit. Evidence for sedentary winter occupation and pursuits at 45-OK-250 is found in the artifact assemblages where more hide preparation tools, including drills, scrapers and utilized debitage are found. The assemblage at 45-OK-4 speaks of more active pursuits, with greater density of cultural material, predominantly bone and lithics, greater use of easily acquired and discarded quartzite raw materials, more projectile points and point fragments, fewer support stones and more identifiable fauna including salmon suggesting less processing for storage and more immediate consumption.

We can develop several explanations for these differences. If we emphasize the general temporal contrasts between the sites, we can suggest a shift in site function and season of occupancy from winter village to summer fishing encampment. This shifting pattern of site use, even within a single temporal phase, has been noted at both 45-DO-211, where postulated summer structures and winter dwellings alternate through time (Lohse 1984b), and at 45-DO-242, where an apparent base camp overlies a Hudnut housepit occupation (Lohse 1984c).

We can also regard both sites as areas within a single geographic unit and suggest a broader pattern of functional specialization within that unit. 45-OK-4, with more structures, may have been closer to the primary cluster of dwellings on this segment of the river. Conversely, 45-OK-250 may have been more peripheral and, hence, less intensively used, with less diversity of activities evident in cultural deposits. In this interpretation the two sites may give evidence for seasonal fragmentation of the groups using this locale. We can speculate that larger groups occupied more dwellings in the winter with fragmentation into smaller social units in the spring and summer. Smaller task groups may have left the area, some returning for the fish runs of summer. Others may have been year-round residents. We might expect excavation of an intact village to show more structures with evidence of primarily winter occupation and a smaller number with evidence of additional summer use. This pattern of use would also result in differential rates of artifact accumulation reflected in cultural material densities across the area. We may be witnessing such a pattern in the Hudnut Phase use of these sites. Both sites may be regarded as on the periphery, farthest from the river, of a larger residential area. Erosion of the remaining area prevents us from determining the primary location of the prehistoric village. However, we can note the greater number of structures located at 45-OK-4 and suggest the concentration of dwellings and activities to the east of 45-OK-250.

When we add temporal information to this construct, we can suggest population decrease in the later Hudnut Phase represented by continued use of 45-OK-4 and relative abandonment of 45-OK-250. This interpretation directly opposes conclusions drawn from the density data alone, as a larger population in the later Hudnut Phase is suggested by the greater density of cultural material and the more numerous structures at 45-OK-4.

PROJECT CONTEXT

Sites 45-OK-250 and 45-OK-4 have yielded information allowing us to characterize Hudnut Phase occupations. The sites represent a continuation of a cultural pattern well-established in the Kartar Phase by 5000 B.P. (Lohse 1984f). In both phases dwellings were constructed and maintained at year-round settlements and inhabitants exploited a similar broad range of faunal and floral resources with an emphasis on hunting of large game species supplemented by fishing and shellfish and plant collection. Differences between the Kartar and Hudnut Phases are also apparent, but they represent variation within the same spectrum of resources and activities rather than massive disruption and replacement of one archaeological culture by another.

In the artifact assemblage, there are obvious technological, functional and stylistic contrasts between Kartar and Hudnut Phases. As shown in Table 7-1, lithic raw material selection differs between the phases. The often cited greater use of basalt in early Kartar and Cascade assemblages is apparent (cf., Nelson 1969, Leonhardy and Rice 1970). We also note other variations in lithic raw material including higher relative frequency of opal in the Hudnut Phase. Although variations in the technological analysis applied at 45-OK-11 may have resulted in a skewed representation of this material type, other excavations suggest that this is a recognizable trend in the project area (Chatters 1984).

Table 7-1. Major lithic material types in Kartar and Hudnut Phase components, 45-OK-250, 45-OK-4 and 45-OK-11.

	Component			
Material	45-OK-11 Kartar	45-OK-11 Hudnut	45-OK-250 Hudnut (Zone 52)	45-OK-4 Hudnut (Zone 52)
Jasper	35.4%	40.2%	23.8%	9.5%
Chalcedonly	6.2	6.4	8.6	5.4
Opal	6.3	20.9	46.8	49.4
Quartzite	19.6	13.7	18.4	25.8
Fine-grained quartzite	4.3	2.1	0.1	0.4
Basalt	18.9	10.6	0.7	1.3
Fine-grained basalt	6.7	4.0	0.3	6.5
Total N	27,027	24,803	10,560	12,118

Although the raw lithic materials and the techniques of reduction differed similar formal tools were produced in each phase. In contrast to the Kartar Phase (Lohse 1984d) we have no evidence of a Hudnut Levallois manufacturing process, a technique suited to producing large blades from basalt (Muto 1976). Rather, the Hudnut Phase lithic assemblages show extensive use and reuse of predominately cryptocrystalline materials. The method of reduction was probably a bipolar one (Flenniken 1978:105) to maximize the use of initially small primary pieces of raw material. A major contrast between the Phases is the lower number of cobble tools in the Hudnut. The cobble tools are of different lithic material and have fewer wear locations and less wear complexity. We have difficulty explaining this contrast. The functions implied by the wear on the Kartar Phase cobble tools can be duplicated by tools in the Hudnut Phase. However, intensity and diversity of use on the Kartar tools suggests that if they were replaced by several different kinds of objects used more casually and more readily discarded then we should detect a proliferation of numbers and varieties of these replacements in the Hudnut Phase, which is not the case. We have fewer cobble tools in the Hudnut Phase assemblages, although they show more singularity of function than the Kartar implements. Nor do we find a satisfactory explanation in the replacement of Kartar cobble tools by innovations in the Hudnut Phase assemblages: the kinds of formed objects are similar; mauls, pestles, choppers, tabular knives, support stones, etc. are found in both Phases. Finally, there is little in the faunal or botanical assemblages of either Phase to suggest differences in economic focus or subsistence pursuits related to the cobble implements.

A second distinct contrast between the phases is the stylistic change in projectile points. The Hudnut Phase is dominated by the Rabbit Island stemmed forms; the Kartar by Cascade lanceolate forms. Both phases contain representatives of each style and lower frequencies of other styles, but the proportions are very different.

The faunal species exploited in the two phases are virtually identical, predominantly consisting of small artiodactyls (deer, mountain sheep, antelope). Both non-mammalian vertebrate assemblages include turtle and salmon. We lack only bison, bear and a few of the small mammal species to duplicate the faunal list of the Kartar Phase at 45-OK-11 (Lohse 1984f).

The botanical assemblages of each phase are also similarly dominated by conifers including yellow, ponderosa and lodgepole pine, larch, and Douglas fir. Bitterbrush is the most common hardwood. The remainder of the botanical assemblages consists of small percentages of edible material and herbaceous tissues. The edible material includes evidence of root, fruit and seed procurement in each phase. Artifacts, incuding pestles, mortars and millingstones, show that plant processing was an established practice in both phases.

The feature analysis provides some of the more interesting contrasts between the Phases, some characteristics which may be useful in future identification of Hudnut Phase components, and suggestions of trends to be considered from a project-wide perspective. Size and depth of house structures has been noted as dependent more on local factors of slope and matrix than temporal, cultural changes. Contrasts with the Kartar Phase that may be temporally distinctive, however, are the round to oval shape of the structures, evidence for interior structural supports and interior pits, and the lack of well-defined interior firepits. Other cultural features from the Hudnut Phase do not vary greatly in form, type and quantity. The analysis of cultural features also indicates extensive reuse the Hudnut Phase structures.

These observations augmented by the other analyses form trends which may be due to shifts in site function. First, the proportions of shell (Table 7-2) in each assemblage differ with the 45-OK-11 Kartar Phase component showing the greatest proportion. While this may signal only a contrast between the microenvironments of the sites, we note that Zone 15, the earliest at 45-OK-250, shows proportions similar to the Kartar Phase, although the total number of artifacts is much lower (Table 2-3). However, this may not be a unique charactoeristic of early occupations as the nonhousepit Hudnut component of 45-DO-214 (Miss 1984a) has comparable high relative frequencies of shell.

The second observation concerns the numbers of structures from each phase and the associated density of artifacts. At all sites both interior and exterior areas were sampled. 45-OK-11 has the greatest number of structures and yet the lowest density of cultural material except for the non-housepit Hudnut component. The increased density over time may suggest increased populations in the Hudnut Phase, greater concentration of activities in a smaller area, or continuous occupation over a longer period of time. The second suggestion could be related to decreases in the size of the economically exploited area needed to support social groups similar to those of the Kartar Phase, the reduction resulting from technological, environmental or cultural changes which are not immediately apparent.

Table 7-2. Assemblage composition of Hudnut and Kartar Phase components at 45-OK-250, 45-OK-4 and 45-OK-11.

Component	Estimated Age (B.P.)	Lithics (%)	Bone (%)	Shell (%)	FMR (%)	Nonlithic (%)	Total (N)	Housepits (N)	Volume m³	Density (obj/m³)
45-OK-11 Kartar	5400-4100	6.4	48.1	43.8	1.6	0.1	423,514	11	579.3	731.1
45-OK-11 Hudnut	3800-2800	17.5	64.4	14.1	3.8	0.2	141,356	-	350.3	403.5
45-OK-250 Hudnut	3800-2800	4.7	71.8	21.5	1.8	0.1	226,324	2	155.6	1,454.5
45-OK-4	3200-2000	5.8	83.2	8.8	2.2	<0.1	210,196	5	93.2	2,255.3

At this point we cannot favor any one of these possibilities. They must be assessed from a regional perspective, taking into account sites of different function and location from each phase.

REGIONAL COMPARISONS AND SUMMARY

When we compare the Hudnut Phase assemblages of 45-OK-250 and 45-OK-4 to the elements defining the Frenchman Springs Phase of Nelson (1969:33-34), we find virtual correspondence between the two, including the presence of stylistically similar projectile points, flake tools, bone artifacts, and oddities such as quartz crystals, graphite pendants and shell disc beads. In addition, we find the presence of many of the artifacts considered diagnostic of the the later Cayuse Phase, including nephrite adzes and exotic shell. The greatest contrast with other phase systems Nelson 1969, Grabert 1968; Chance and Chance 1982) is the obvious presence of a well-established, centrally based hunting and gathering economy organized around village locales with knowledge of fishing and fishing technology. The Hudnut Phase continues a pattern identified even earlier in the Project area. Explanations of its emergence can no longer be traced to relatively late technological innovations in fishing, storage or plant use nor to the influx of populations bearing new knowledge.

The identification of the "ethnographic winter village pattern" has been a constant concern in Plateau archaeology as have explanations for its development (cf., Galm et al. 1981; Nelson 1969; Rice 1974; Schalk 1982; Swanson 1962). The cultural deposits of 45-OK-250 and 45-OK-4 represent the Hudnut Phase and reveal both the continuity and contrast among the project area phases and within the phase itself. The data presented in this and the report from 45-OK-11 (Lohse 1984f) obviously call into question many of the theories formulated.

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APPENDIX A:

RADIOCARBON DATE SAMPLES, 45-OK-250 AND 45-OK-4

Table A-1. Radiocarbon date samples, 45-OK-250.

Lab Sample #1	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Years B.P.) T1/2=5730	Dendrocorrected2 Age (Years B.P.)
TX-3127	13	III	160	Test Pit #2 (SW)	150	-	Charcoal/5.1	2441±240	2456±262
	Testing date, this unit not zoned.								
B-4335	23	III	125	10N40W	150	28	Charcoal/20	3080±70	3349±89
B-4336	13	III	150	4N26W	160	102	Charcoal/10	2800±70	2989±76
	Feature 102 = postmold in Housepit 1. Sample was both a flot and a carbon sample. The flot contained occupation debris: Ponderosa pine (*P. ponderosa*), Douglas Fir (*Pseudotsuga menziesii*), conifer bark, serviceberry (*Amelanchier alnifolia*) pitch, and 2 goosefoot seeds (1 is *Chenopodium fremontii*). No disturbance.								
B-4337	13	III	150	0N27W	130	7	Charcoal/5.4	3920±80	4448±123
	Feature 7 = Housepit 1 floor. Sample is incompletely carbonized Ponderosa pine (*Pinus ponderosa*) with pitch. Much wood from Feature 7 flotation samples is incompletely carbonized, so no particular significance is attached to this. A fresh juniper seed was found near the sample, and indicates disturbance. The date may not represent Feature 7.								
B-4338	13	III	110	2N22W	90	96	Charcoal/2.5	2960±150	3194±153
	Feature 96 = exterior firepit, just outside of Housepit 1. Sample is Pinaceae (Pine Family) and serviceberry (*Amelanchier alnifolia*) charcoal. No disturbance.								
B-4339	13	III	110	1N22W	60	-	Charcoal/5	2940±70	3168±76
B-4340	13	III	160	9S30W	140	95	Charcoal/3.6	3060±90	3323±105
	Feature 95 = occupation (?) layer in southern dump area. Sample is semi-charred Douglas Fir (*Pseudotsuga menziesii*). No disturbance.								
B-4341	13	III	150	5S28W	160	7	Charcoal/5	2980±90	3219±95
	Feature 7 = Housepit 1 floor.								
B-4342	13	III	150	6N32W	130	125	Charcoal/8	3160±80	3453±97
	Feature 125 = charcoal stain with orange matrix; makes up NW rim of Housepit 1. Sample consists of semi-charred Douglas Fir (*Pseudotsuga menziesii*) and birch (*Betula* sp.). The birch was partially decayed before it was burned. No disturbance.								
B-4343	13	III	160	9S28W	190	132	Charcoal/6	2920±80	3143±85
	Feature 132 = surface hearth feature below Feature 95, occupation surface in southern dump area. Sample consists of charred Bitterbrush (*Purshia tridentata*) and Hackberry (*Celtis douglasii*). No disturbance.								

[1] TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.
B samples were dated by Beta Analytic, Inc.

[2] Dendrocorrected according Damon et al. 1974.

Table A-2. Radiocarbon date samples, 45-OK-4.

Lab Sample #[1]	Zone	OU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Years B.P.) T1/2=5730	Dendrocorrected[2] Age (Years B.P.)
B-4748	42	III	60	17S61W	130	6	Charcoal/5	2290±85	2360±134
	Feature 6 = floor of probable structure on west side of site.								
B-4749	32	III	160	13S18E	120	29	Charcoal/5	2065±90	2097±132
	Feature 29 = Floor 2 (upper), Housepit 2.								
B-4750	31	IV	102	8S18E	70		Charcoal/10	655±55	670±63
B-4751	32	III	60	2S30E	140	20	Charcoal/5	2355±100	2438±145
	Feature 20 = floor, Housepit 6.								
B-4752	42	III	400	15S26W 16S26W	80 90	 12	Charcoal/4.5	2725±80	2895±94
	Three samples combined.								
B-4753	32	III	160	19S12E 19S12E	80 90		Charcoal/4.9	2670±70	2825±86
	Three samples combined. Unfeatured bone scatter/occupation on surface.								
B-4754	32	III	99	6S41E	220	41	Charcoal/5	2685±110	2845±121
	Feature 41 = pit, sample taken from 20 cm. above base of pit.								
B-4755	32	III	160	18S13E	40		Charcoal/4.1	2950±85	3180±90
B-4756	32	III	150	10S11E 11S11E 11S10E	120 120 130	23 23 23	Charcoal/5.9	2875±110	3085±114
	Feature 23 = Floor 1 (lower), Housepit 5. Four samples combined								
B-4823	43	III	N/A	27S89W	120	9	Charcoal/5.3	3285±105	3630±113
	Feature 9 = occupation surface. Strata not defined in this unit. Two samples combined.								

[1] B samples were dated by Beta Analytic, Inc.
[2] Dendrocorrected according to Damon et al. 1974.

APPENDIX B:

ARTIFACT ASSEMBLAGE, 45-OK-250 AND 45-OK-4

Table B-1. Formal artifact categories by zone, 45-OK-250 and 45-OK-4.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Projectile point	N	9	15	27	6	1	2	5	3	-	68	27	38	2	6	7	5	85
	%	5.6	5.7	6.2	6.7	2.7	3.3	4.2	5.2		5.5	12.9	8.2	6.5	9.4	11.9	25.0	10.1
Projectile point base	N	7	6	3	2	2	1	6	1	1	29	6	11	1	1	-	-	19
	%	4.3	2.3	0.7	2.2	5.4	1.6	5.0	1.7	14.3	2.4	2.9	2.4	3.2	1.6			2.3
Projectile point tip	N	9	2	10	3	2	2	1	2	-	31	8	17	1	5	6	1	38
	%	5.6	0.8	2.3	3.4	5.4	3.3	0.8	3.4		2.5	3.8	3.7	3.2	7.8	10.2	5.0	4.5
Biface	N	12	22	34	13	1	9	15	10	1	117	26	58	4	10	3	3	104
	%	7.5	8.4	7.8	14.6	2.7	14.8	12.6	17.2	14.3	9.5	12.4	12.6	12.9	15.6	5.1	15.0	12.3
Adze	N	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
	%												0.4					0.2
Amorphously flaked cobble	N	-	-	-	-	1	-	1	-	-	2	-	1	-	-	-	-	1
	%					2.7		0.8			0.2		0.2					0.1
Burin	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												0.2					0.1
Chopper	N	2	3	4	-	-	1	2	4	-	16	4	7	2	2	-	1	16
	%	1.2	1.1	0.9			1.6	1.7	6.9		1.3	1.9	1.5	6.5	3.1		5.0	1.9
Drill	N	2	1	7	1	1	-	4	-	-	16	3	3	-	2	1	-	9
	%	1.2	0.4	1.6	1.1	2.7		3.4			1.3	1.4	0.7		3.1	1.7		1.1
Graver	N	-	1	3	-	-	-	2	-	-	6	6	4	1	1	2	-	14
	%		0.4	0.7				1.7			0.5	2.9	0.9	3.2	1.6	3.4		1.7
Maul	N	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%		0.1								0.1							
Pestle	N	1	-	1	-	-	-	1	-	-	3	-	-	-	-	-	-	-
	%	0.6		0.2				0.8			0.2							
Scraper	N	2	7	4	2	-	-	3	4	-	22	6	8	2	-	-	-	16
	%	1.2	2.7	0.9	2.2			2.5	6.9		1.8	2.9	1.7	6.5				1.9
Tabular knife	N	29	59	86	4	7	3	13	2	1	204	38	124	4	13	24	2	205
	%	18.0	22.5	19.7	4.5	18.9	4.9	10.9	3.4	14.3	18.6	18.2	26.9	12.9	20.3	40.7	10.0	24.3
Bead	N	1	1	10	-	-	-	-	3	-	15	1	12	3	-	-	1	17
	%	0.6	0.4	2.3					5.2		1.2	0.5	2.6	9.7			5.0	2.0
Anvil	N	-	2	-	-	1	-	1	-	-	4	1	-	-	-	-	-	1
	%		0.8			2.7		0.8			0.3	0.5						0.1
Edge-ground cobble	N	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%		0.4								0.1							
Hammerstone	N	3	8	17	1	-	-	6	-	-	35	3	29	-	-	2	1	35
	%	1.9	3.1	3.9	1.1			5.0			2.8	1.4	6.3			3.4	5.0	4.1
Hopper mortar base	N	-	-	-	-	-	-	-	-	-	-	1	3	-	-	-	-	4
	%											0.5	0.7					0.5
Milling stone	N	-	4	14	2	1	-	2	2	-	25	-	6	-	-	-	-	6
	%		1.5	3.2	2.2	2.7		1.7	3.4		2.0		1.3					0.7

Table B-1. Cont'd.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Shaped/incised siltstone	N	3	16	12	-	-	3	-	5	-	39	-	2	-	-	-	-	2
	%	1.9	6.1	2.8			4.9		8.6		3.2		0.4					0.2
Burin spall	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												0.2					0.1
Blade	N	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%	0.6									0.1							
Linear flake	N	2	2	2	1	-	-	-	-	-	7	3	4	-	2	-	-	9
	%	1.2	0.8	0.5	1.1						0.6	1.4	0.9		3.1			1.1
Core	N	-	1	5	2	-	-	-	-	-	8	-	10	2	-	-	-	12
	%		0.4	1.1	2.2						0.7		2.2	6.5				1.4
Resharpening flake	N	8	13	13	4	1	3	3	2	-	47	1	3	-	-	-	-	4
	%	5.0	5.0	3.0	4.5	2.7	4.9	2.5	3.4		3.8	0.5	0.7					0.5
Bifacially retouched flake	N	13	18	25	7	4	6	6	2	2	83	6	8	1	2	2	1	20
	%	8.1	6.9	5.7	7.9	10.8	9.8	5.0	3.4	28.6	6.7	2.9	1.7	3.2	3.1	3.4	5.0	2.4
Unifacially retouched flake	N	14	25	36	11	5	10	13	4	-	118	11	28	1	7	1	1	49
	%	8.7	9.5	8.3	12.4	13.5	16.4	10.9	6.9		9.6	5.3	6.1	3.2	10.9	1.7	5.0	5.8
Utilized only	N	42	53	117	29	9	20	34	14	2	320	48	66	6	11	8	3	142
	%	26.1	20.2	26.2	32.6	24.3	32.8	28.6	24.1	28.6	26.0	23.0	14.3	19.4	17.2	13.6	15.0	16.8
Indeterminate	N	1	1	4	1	1	1	1	-	-	10	10	15	1	2	3	1	32
	%	0.6	0.4	0.9	1.1	2.7	1.6	0.8			0.8	4.8	3.3	3.2	3.1	5.1	5.0	3.8
Other fragments	N	-	-	2	-	-	-	-	-	-	2	-	-	-	-	-	-	-
	%			0.5							0.2							
Total	N	161	262	436	89	37	61	119	58	7	1,230	209	461	31	64	59	20	844

Table B-2. Material type by zone, 45-OK-250 and 45-OK-4.

Material Type		Zone 45-OK-250										Zone 45-OK-4						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Jasper	N	632	869	1,472	356	130	282	437	249	26	4,453	575	1,012	89	161	144	28	2,009
	%	25.8	24.7	20.3	21.2	24.5	44.2	38.2	48.3	33.8	25.1	13.3	9.4	12.3	13.2	10.9	10.4	10.8
Chalcedony	N	279	330	518	134	49	92	180	78	6	1,667	365	605	56	90	50	13	1,179
	%	11.4	9.4	7.1	8.0	9.2	14.4	16.2	15.3	7.8	9.4	8.5	5.6	7.7	7.4	3.8	4.9	6.3
Petrified wood	N	2	7	2	-	-	1	6	1	-	19	15	28	3	2	3	-	51
	%	0.1	0.2	<0.1			0.2	0.5	0.2		0.1	0.3	0.3	0.4	0.2	0.2		0.3
Obsidian	N	2	5	1	4	2	-	1	3	-	18	6	7	-	1	-	-	14
	%	0.1	0.1	<0.1	0.2	0.4		0.1	0.6		0.1	0.1	0.1		0.1			0.1
Opal	N	1,045	1,404	3,496	1,013	208	166	331	101	35	7,799	1,973	5,552	170	640	430	109	8,874
	%	42.7	39.9	48.2	60.2	39.2	26.0	28.7	19.6	45.5	43.9	45.7	51.4	23.4	52.5	32.6	40.7	47.6
Quartzite	N	442	818	1,606	150	122	54	128	57	7	3,384	941	2,612	151	260	511	98	4,571
	%	18.0	23.2	22.2	8.9	23.0	8.5	11.5	11.0	9.1	19.0	21.8	24.2	20.8	21.3	38.7	35.8	24.5
Fine-grained quartzite	N	3	4	11	-	-	4	3	1	-	26	26	35	4	5	10	2	82
	%	0.1	0.1	0.2			0.6	0.3	0.2		0.1	0.6	0.3	0.6	0.4	0.8	0.7	0.4
Basalt	N	17	35	55	12	5	3	7	5	3	142	44	142	21	11	19	2	239
	%	0.7	1.0	0.8	0.7	0.9	0.5	0.6	1.0	3.9	0.8	1.0	1.3	2.9	0.9	1.4	0.7	1.3
Fine-grained basalt	N	8	9	20	6	5	4	6	3	-	61	291	648	225	36	137	15	1,352
	%	0.3	0.3	0.3	0.4	0.9	0.6	0.5	0.6		0.3	6.7	6.0	31.0	3.0	10.4	5.6	7.3
Silicized mudstone	N	5	8	9	1	2	1	3	-	-	29	61	67	3	11	11	-	153
	%	0.2	0.2	0.1	0.1	0.4	0.2	0.3			0.2	1.4	0.6	0.4	0.9	0.8		0.8
Argillite	N	-	-	2	-	-	25	3	6	-	36	-	-	-	-	-	-	-
	%			<0.1			3.9	0.3	1.2		0.2							
Granitic	N	6	11	28	3	3	1	5	2	-	59	11	43	-	-	2	1	57
	%	0.2	0.3	0.4	0.2	0.6	0.2	0.4	0.4		0.3	0.3	0.4			0.2	0.4	0.3

Table B-2. Cont'd.

Material Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Sandstone	N	1	–	1	–	–	–	–	–	–	2	–	–	–	–	–	–	–
	%	<0.1		<0.1							<0.1							
Nephrite	N	1	–	1	–	–	–	–	–	–	2	–	1	–	–	–	–	1
	%	<0.1		<0.1							<0.1		<0.1					<0.1
Siltstone/ mudstone	N	3	16	13	–	–	3	–	5	–	40	–	2	–	–	–	–	2
	%	0.1	0.5	0.2			0.5		1.0		0.2		<0.1					<0.1
Steatite	N	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1
	%												<0.1					<0.1
Schist	N	–	–	–	–	–	–	–	–	–	–	–	4	–	1	1	–	6
	%												<0.1		0.1	0.1		<0.1
Shale	N	–	–	1	–	–	–	–	–	–	1	1	9	–	–	–	–	10
	%			<0.1							<0.1	<0.1	0.1					0.1
Quartz	N	–	–	–	–	–	–	2	–	–	2	–	1	–	–	1	–	2
	%							0.2			<0.1		<0.1			0.1		<0.1
Graphite/ molybdenite	N	–	–	1	–	–	–	–	–	–	1	1	–	–	–	–	–	1
	%			<0.1							<0.1	<0.1						<0.1
Very fine-grained sand	N	–	–	1	–	–	–	–	–	–	1	1	1	–	–	–	–	2
	%			<0.1							<0.1	<0.1	<0.1					<0.1
Indeterminate/ missing	N	4	3	9	4	4	2	2	4	–	32	4	28	4	–	1	2	39
	%	0.2	0.1	0.1	0.2	0.8	0.3	0.2	0.8		0.2	0.1	0.3	0.6		0.1	0.7	0.2
Total	N	2,450	3,519	7,247	1,683	530	638	1,114	516	77	17,774	4,315	10,798	726	1,218	1,320	268	18,645

Table B-3. Cryptocrystalline artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Projectile pont	N	9	14	1, 24	6	1	2	5	3	-	64	22	32	2	4	6	3	69
	%	0.5	0.5	0.4	0.4	0.3	0.4	0.5	0.7		0.5	0.8	0.4	0.6	0.4	1.0	2.0	0.6
Projectile point base	N	5	6	2	2	2	1	6	1	1	26	4	6	1	-	-	-	11
	%	0.3	0.2	<0.1	0.1	0.5	0.2	0.6	0.2	1.4	0.2	0.1	0.1	0.3				0.1
Projectile point tip	N	8	2	10	3	2	2	1	2	-	30	7	16	1	4	6	1	35
	%	0.4	0.1	0.2	0.2	0.5	0.4	0.1	0.5		0.2	0.2	0.2	0.3	0.4	1.0	0.7	0.3
Biface	N	11	22	34	13	1	9	14	10	1	115	20	51	2	10	3	2	88
	%	0.8	0.8	0.8	0.9	0.3	1.6	1.4	2.3	1.4	0.8	0.7	0.7	0.6	1.1	0.5	1.3	0.7
Burin	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												<0.1					<0.1
Drill	N	2	1	7	1	1	-	4	-	-	16	3	3	-	2	1	-	9
	%	0.1	<0.1	0.1	0.1	0.3		0.4			0.1	0.1	<0.1		0.2	0.2		0.1
Graver	N	-	1	3	-	-	-	2	-	-	6	6	4	1	1	2	-	14
	%		<0.1	0.1				0.2			<0.1	0.2	0.1	0.3	0.1	0.3		0.1
Scraper	N	2	7	4	2		-	2	4	-	21	6	8	1	-	-	-	15
	%	0.1	0.3	0.1	0.1			0.2	0.9		0.2	0.2	0.1	0.3				0.1
Bead	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			<0.1							<0.1							
Burin spall	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												<0.1					<0.1
Blade	N	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%	0.1									0.1							
Linear flake	N	2	2	2	1	-	-	-	-	-	7	3	4	-	2	-	-	9
	%	0.1	0.1	<0.1	0.1						0.1	0.1	0.1		0.2			0.1
Core	N	-	1	5	2	-	-	-	-	-	8	-	10	2	-	-	-	12
	%		<0.1	0.1	0.1						0.1		0.1	0.6				0.1
Resharpening flake	N	7	13	13	4	1	3	3	2	-	46	1	3	-	-	-	-	4
	%	0.4	0.5	0.2	0.3	0.3	0.5	0.3	0.5		0.3	<0.1	<0.1					<0.1

Table B-3. Cont'd.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Bifacially retouched flake	N	13	18	24	7	4	5	6	2	2	81	5	8	1	2	1	1	18
	%	0.7	0.7	0.4	0.5	1.0	0.9	0.6	0.5	2.9	0.6	0.2	0.1	0.3	0.2	0.2	0.7	0.1
Unifacially retouched flake	N	14	25	36	11	5	10	12	4	-	117	10	27	1	7	1	1	47
	%	0.7	1.0	0.7	0.7	1.3	1.8	1.2	0.9		0.8	0.3	0.4	0.3	0.8	0.2	0.7	0.4
Utilized only flake	N	42	52	115	28	8	20	33	14	2	314	42	58	2	11	8	3	124
	%	2.1	2.0	2.1	1.9	2.1	3.6	3.4	3.2	2.9	2.2	1.4	0.8	0.6	1.2	1.3	2.0	1.0
Indeterminate	N	-	-	1	-	-	-	1	-	-	2	1	1	-	-	1	-	3
	%			<0.1				0.1			<0.1	<0.1	<0.1			0.2		<0.1
Other fragments	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			<0.1							<0.1							
Conchoidal flake	N	1,663	2,211	4,868	1,314	321	452	794	346	56	11,825	2,658	6,653	296	798	571	131	11,107
	%	84.9	84.7	85.0	87.3	82.9	81.9	82.1	78.1	81.2	84.6	90.8	92.4	93.1	89.4	91.1	87.3	91.7
Tabular flake	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												<0.1					<0.1
Chunk	N	177	234	540	111	40	45	84	52	7	1,280	140	310	8	52	27	8	545
	%	9.0	9.0	9.8	7.4	10.3	8.2	8.7	11.7	10.1	9.2	4.8	4.3	2.5	5.8	4.3	5.3	4.5
Weathered	N	2	2	3	-	1	3	-	3	-	14	-	-	-	-	-	-	-
	%	0.1	0.1	0.1		0.3	0.5		0.7		0.1							
Total	N	1,958	2,611	5,493	1,505	387	552	967	443	69	13,985	2,928	7,197	318	893	627	150	12,113

Table B-4. Quartzite artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Quartzite																		
Amorphously flaked cobble	N	–	–	–	–	1	–	–	–	–	1	–	–	–	–	–	–	–
	%					0.8					<0.1							
Chopper	N	1	–	1	–	–	–	1	1	–	4	3	3	1	2	–	–	9
	%	0.2		0.1				0.8	1.8		0.1	0.3	0.1	0.7	0.8			0.2
Tabular knife	N	29	59	86	4	7	3	13	2	1	204	38	124	4	13	23	2	204
	%	6.6	7.2	5.4	2.7	5.7	5.5	10.2	3.5	14.3	6.0	4.0	4.7	2.6	5.0	4.5	2.1	4.5
Hammerstone	N	–	–	1	–	–	–	–	–	–	1	2	7	–	–	–	–	9
	%		0.1								<0.1	0.2	0.3					0.2
Milling stone	N	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–
	%			0.1							<0.1							
Resharpening flake	N	1	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–
	%	0.2									<0.1							
Utilized only flake	N	–	–	–	1	–	–	1	–	–	2	–	–	–	–	–	–	–
	%				0.7			0.8			0.1							
Indeterminate	N	–	–	–	–	–	–	–	–	–	–	3	2	1	–	–	1	7
	%											0.3	0.1	0.7			1.0	0.2
Other fragment	N	–	–	1	–	–	–	–	–	–	1	–	–	–	–	–	–	–
	%			0.1							<0.1							
Conchoidal flake	N	11	25	51	8	6	6	9	2	1	119	8	17	3	5	6	2	41
	%	2.5	3.1	3.2	5.3	4.9	10.9	7.0	3.5	14.3	3.5	0.8	0.7	2.0	1.9	1.2	2.1	0.9
Tabular flake	N	384	699	1,400	126	103	41	92	43	5	2,893	836	2,361	137	218	458	88	4,098
	%	86.9	85.5	87.2	84.0	84.4	74.5	71.9	75.4	71.4	85.5	88.8	90.4	90.7	83.8	89.6	91.7	89.7
Chunk	N	16	35	65	10	5	4	12	8	–	155	51	98	5	22	24	3	203
	%	3.6	4.3	4.0	6.7	4.1	7.3	9.4	14.0		4.6	5.4	3.8	3.3	8.5	4.7	3.1	4.4
Weathered	N	–	–	–	1		1	–	1	–	3	–	–	–	–	–	–	–
	%				0.7		1.8		1.8		0.1							
Total	N	442	818	1,606	150	122	55	128	57	7	3,385	941	2,612	151	260	511	98	4,571

Table B-4. Cont'd.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Fine-Grained Quartzite																		
Biface	N	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1
	%												2.9					1.2
Chopper	N	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1
Scraper	N	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	1
	%													25.0				1.2
Unifacially retouched flake	N	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	1
	%												2.9					1.2
Utilized only flake	N	–	–	–	–	–	–	–	–	–	–	–	1	1	–	–	–	2
	%												2.9	25.0				2.4
Conchoidal flake	N	–	–	–	–	–	–	–	–	–	–	22	24	2	2	10	2	62
	%											84.6	68.6	50.0	40.0	100.0	100.0	75.6
Tabular flake	N	–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	2
	%												5.7					2.4
Chunk	N	–	–	–	–	–	–	–	–	–	–	4	5	–	3	–	–	12
	%											15.4	14.3		60.0			14.6
Total	N	–	–	–	–	–	–	–	–	–	–	26	35	4	5	10	2	82

Table B-5. Basalt artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Projectile point	N	-	1	1	-	-			-	-	2	4	6	-	1	1	1	13
	%		2.3	1.3		0.8					1.0	1.2	0.8		2.1	0.6	5.9	0.8
Projectile point base	N	2	-	1		-	-	-	-	-	3	2	4	-	1	-	-	7
	%	8.0		1.3							1.5	0.6	0.5		2.1			0.4
Projectile point tip	N	-	-	-	-	-		-	-	-		1	1	-	-	-	-	2
	%											4.0	0.1					0.1
Biface	N	1	-	-	-	-	-	-	-	-	1	6	5	1	-	-	1	13
	%	4.0									0.5	1.8	0.6	0.4			5.9	0
Amorphously flaked cobble	N	-	-	-	-	-		1		-	1		1	-	-	-	-	1
	%							7.7			0.5		0.1					0.1
Chopper	N	-	3	3	-	-		1	3	-	10	-	3	1	-	-	1	5
	%		6.8	4.0				7.7	37.5		4.9		0.4	0.4			5.9	0.3
Maul	N	-	1	-	-		-		-	-	1	-	-	-	-	-	-	-
	%		2.3								0.5							
Pestle	N	1	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-
	%	4.0						7.7			1.0							
Scraper	N	-	-	-	-		-	1	-	-	1		-	-	-	-	-	-
	%							7.7			0.5							
Bead	N	-	-	2	-	-		-	-	-	2	-	-	-	-	-	-	-
	%			2.7							1.0							
Anvil	N	-	1	-	-	-		-	-	-	1	-	-	-	-	-	-	-
	%		2.3								0.5							
Hammerstone	N	2	3	6		-	-	1		-	12	-	6	-	-	1	-	7
	%	8.0	6.8	8.0				7.7			5.9		0.8			0.6		0.4
Hopper mortar base	N	-	-		-	-		-		-	-	1	-		-	-	-	1
	%											0.3						0.1
Milling stone	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												0.1					0.1
Bifacially retouched flake	N	-	-	1	-	-		-	-	-	1	-	-	-	-	1	-	1
	%			1.3							0.5					0.6		0.1
Unifacially retouched flake	N	-	-		-	-		-	-		-	1	-	-	-	-	-	1
	%											0.3						0.1
Utilized only flake	N	-	-	2	-	1	-	-	-	-	3	4	5	3	-	-	-	12
	%			2.7		10.0					1.5	1.2	0.6	1.2				0.8
Indeterminate	N	-	-	1	-	-	1	-	-	-	2	2	5	-	2	-	-	9
	%			1.3			14.3				1.0	0.6	0.6		4.3			0.6
Conchoidal flake	N	15	28	50	16	8	6	8	5	3	139	312	744	240	41	150	14	1,501
	%	60.0	63.6	66.7	88.9	80.0	85.7	61.5	62.5	100.0	68.5	93.1	94.2	97.6	87.2	96.2	82.4	94.3
Tabular flake	N	-	-	1	-		-	-	-	-	1	-	-	-	-	-	-	-
	%			1.3							0.5							
Chunk	N	4	5	6	1	1	-	-	-	-	17	2	9	1	2	3	0	17
	%	16.0	11.4	8.0	5.6	10.0					8.4	0.6	1.1	0.4	4.3	1.9		1.1
Total	N	25	44	75	18	10	7	13	8	3	203	335	790	246	47	156	17	1,591

Table B-6. Granitic, obsidian, other, and indeterminate artifacts by zone, 45-OK-250 and 45-OK-4.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Granitic																		
Chopper	N	1	-	-	-	-			-	-	1	1	-	-	-	-	-	1
	%	16.7									1.7	9.1						1.8
Pestle	N	-	-	1	-	-			-	-	1	-	-	-	-	-	-	-
	%			3.6							1.7							
Anvil	N	-	1	-	-	1	-	1	-	-	3	1	-	-	-	-	-	1
	%		9.1			33.3		20.0			5.1	9.1						1.8
Edge-ground cobble	N	-	1	-	-	-	-	-	-	-	1	-			-	-	-	-
	%		9.1								1.7							
Hammerstone	N	1	4	8	1	-		3	-	-	17	-	9	-	-	1	1	11
	%	16.7	36.4	28.6	33.3			60.0			28.8		20.9			50.0	100.0	19.3
Hopper mortar base	N	-	-	-	-				-	-	-	-	3	-	-	-	-	3
	%												7.0					5.3
Milling stone	N	-	2	12	1	1		1	2	-	19	-	5	-	-	-	-	5
	%		18.2	42.9	33.3	33.3		20.0	100.0		32.2		11.6					8.8
Indeterminate	N	-	-	1	-	1				-	2	-	1	-	-	-	-	1
	%			3.6		33.3					3.4		2.3					1.8
Conchoidal flake	N	1	3	4	1	-			-	-	9	8	6	-	-	-	-	14
	%	16.7	27.3	14.3	33.3						15.3	72.7	14.0					24.6
Tabular flake	N	-	-	1	-	-	-	-	-	-	1	1	15	-	-	1	-	17
	%			3.6							1.7	9.1	34.9			50.0		29.8
Chunk	N	3	-	1		-	1	-	-	-	5	-	4	-	-	-	-	4
	%	50.0		3.6			100.0				8.5		9.3					7.0
Total	N	6	11	28	3	3	1	5	2	-	59	11	43	-	-	2	1	57
Obsidian																		
Projectile point	N	-	-	-	-	-	-	-	-	-		1	-	-	-	-	-	1
	%											16.7						7.1
Projectile point base	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												14.3					7.1
Utilized only flake	N	-	1	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1
	%		20.0								5.6	16.7						7.1
Conchoidal flake	N	1	4	1	4	2	-	1	3	-	16	4	6	-	1	-	-	11
	%	50.0	80.0	100.0	100.0	100.0		100.0	100.0		88.9	66.7	85.7		100.0			78.6
Chunk	N	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%	50.0									5.6							
Total	N	2	5	1	4	2	-	1	3	-	18	6	7	-	1	-	-	14

Table B-6. Cont'd.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Other Lithic																		
Projectile point	N	-	-	2	-	-	-	-	-	-	2	-	-	-	1	-	-	1
	%			6.9							1.7				8.3			0.6
Projectile point tip	N	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1
	%														8.3			0.6
Biface	N	-	-	-	-	-	-	1	-	-	1	-	1	1	-	-	-	2
	%							12.5			0.9		1.2	33.3				1.1
Adze	N	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2
	%												2.3					1.1
Bead	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			3.4							0.9							
Hammerstone	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			3.4							0.9							
Shaped/incised siltstone	N	3	16	12	-	-	3	-	5	-	39	-	2	-	-	-	-	2
	%	30.0	66.7	41.4			10.0		45.5		33.9		2.3					1.1
Bifacially retouched flake	N	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
	%											1.6						0.6
Unifacially retouched flake	N	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-
	%							12.5			0.9							
Utilized only flake	N	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	2
	%											1.6	1.2					1.1
Indeterminate	N	1	-	1	-	-	-	-	-	-	2	3	4	-	-	2	-	9
	%	10.0		3.4							1.7	4.7	4.7			15.4		5.1
Conchoidal flake	N	5	7	8	1	1	26	5	5	-	58	59	63	2	9	10	-	143
	%	50.0	29.2	27.6	100.0	50.0	86.7	62.5	45.5		50.4	92.2	73.3	66.7	75.0	76.9		80.3
Tabular flake	N	-	-	-	-	-	-	-	-	-	-	-	10	-	1	1	-	12
	%												11.6		8.3	7.7		6.7
Chunk	N	-	1	3	-	1	1	-	1	-	7	-	3	-	-	-	-	3
	%		4.2	10.3		50.0	3.1		9.1		6.1		3.5					1.7
Weathered	N	1	-	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-
	%	10.0						12.5			1.7							
Indeterminate/ missing	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			3.4							0.9							
Total	N	10	24	29	1	2	30	8	11	-	115	64	86	3	12	13	-	178

Table B-6. Cont'd.

Object Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12*	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Indeterminate Lithic																		
Projectile point	N %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 50.0	1 2.6
Projectile point tip	N %	1 25.0	-	-	-	-	-	-	-	-	1 3.1	-	-	-	-	-	-	-
Tabular knife	N %	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1 100.0	-	1 2.6
Bead	N %	1 25.0	1 33.3	6 66.7	-	-	-	-	3 75.0	-	11 34.4	1 25.0	12 42.9	3 75.0	-	-	1 50.0	17 43.6
Milling stone	N %	-	-	-	-	-	-	1 50.0	-	-	1 3.1	-	-	-	-	-	-	-
Hammerstone	N %	-	-	-	-	-	-	-	-	-	-	1 25.0	7 25.0	-	-		-	8 20.5
Utilized only flakes	N %	-	-	-	-	-	-	-	-	-	-	-	1 3.6	-	-	-	-	1 2.6
Indeterminate	N %	-	1 33.3	-	1 25.0	-	-	-		-	2 6.2	1 25.0	2 7.1	-	-	-	-	3 7.7
Conchoidal flake	N %	-	-	-	-	-		-	1 25.0	-	1 3.1	1 25.0	4 14.3	-	-	-	-	5 12.8
Tabular flake	N %	-	-	-	-	-		-	-	-	-	-	1 3.6	1 25.0	-	-	-	2 5.1
Chunk	N %	1 25.0	-	1 11.1	-	-	2 100.0	1 50.0	-	-	5 15.6	-	-	-	-	-	-	-
Weathered	N %	1 25.0	1 33.3	-	-	-	-	-	-	-	2 6.2	-	-	-	-	-	-	-
Indeterminate/ missing	N %	-	-	2 22.2	3 75.0	4 100.0	-	-	-	-	9 28.1	-	1 3.6	-	-	-	-	1 2.6
Total	N	4	3	9	4	4	2	2	4	-	32	4	28	4	-	1	2	39

Table B-7. Technological analysis of lithic materials, 45-OK-250 and 45-OK-4.

DIMENSION I: OBJECT TYPE

- Conchoidal flake
- Chunk
- Core
- Linear flake
- Unmodified
- Tabular flake
- Formed object
- Weathered
- Indeterminate

DIMENSION II: RAW MATERIAL*

- Shale
- Jasper
- Chalcedony
- Petrified Wood
- Obsidian
- Opal
- Quartzite
- Fine-grained quartzite
- Basalt
- Fine-grained basalt
- Silicized mudstone
- Argillite
- Granite
- Siltstone/mudstone
- Schist
- Steatite
- Graphite/molybdenite
- Sandstone
- Very fine-grained red sandstone
- Nephrite
- Bone/antler
- Ochre
- Shell
- Indeterminate

DIMENSION III: CONDITION

- Complete
- Proximal fragment
- Proximal flake
- Less than 1/4 inch
- Broken
- Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

- None
- Partial cortex
- Complete cortex
- Indeterminate/not applicable

DIMENSION V: TREATMENT

- Definitely burned
- Dehydrated [heat treatment]

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* Only those raw materials recorded at either 45-OK-250 or 45-OK-4 are listed here; a complete list is available in the project's Research Design [Campbell 1984d].

Only some units at 45-OK-250 were given the complete analysis outlined above. A slighty abbreviated analysis [Lithan-AB] was used for the others. In this system, the length of chunks and of non-tabular flakes [object type=non-tabular flake or blade-like flake] with no cortex and not found in situ, was recorded in 5 mm increments.

At 45-OK-4, an even more abbreviated system [Lithan-ABR] was applied. In this system, only worn or manufactured items, cores, blade-like flakes, and formed objects received complete, individual recording of the technological dimensions. Other objects were recorded by group descriptions. See the research design [Campbell 1984d] for additional detail on different coding systems.

Table B-8. Average length of conchoidally flaked material by zone, 45-OK-250 and 45-OK-4.

Material Type		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Cryptocrystalline	X	10.8	10.7	10.9	10.5	10.4	11.1	10.9	11.6	12.7	10.8	11.0	10.8	10.2	9.8	10.5	10.8	10.7
	s.d.	3.3	4.0	4.5	3.5	3.0	4.0	4.0	5.1	4.3	4.1	3.7	3.7	2.4	3.8	3.8	3.7	3.7
	N	1,003	1,363	2,859	765	165	233	477	190	31	7,086	1,346	3,225	142	385	274	76	5,448
Quartzite	X	12.1	11.0	9.6	11.4	9.7	19.8	16.6	27.5		11.5	29.3	26.0	28.3	28.0	20.8	12.5	25.5
	s.d.	3.1	3.3	3.7	2.4	3.7	18.5	13.1	17.7	-	6.9	13.0	20.2	11.5	14.8	6.6	3.5	15.6
	N	11	23	47	7	6	5	7	2		108	7	17	3	5	6	2	40
Fine-grained quartz	X			15.0			20.0				17.5	7.5	21.2			16.4	30.0	18.5
	s.d.	-	-	-	-	-	-	-	-	-	3.5	3.5	21.9	-	-	9.0	-	16.3
	N			1			1				2	2	9			7	1	19
Basalt	X	16.5	11.5	13.9	10.0	11.3	18.4	9.4		11.0	13.2	11.8	11.9	11.0	13.4	11.5	12.2	11.8
	s.d.	10.6	6.5	11.9	-	4.2	9.8	4.4	-	-	9.3	7.6	7.1	4.3	6.0	5.5	2.6	6.6
	N	10	15	28	8	3	5	5		1	75	113	283	86	19	62	9	572
Granitic	X	6.0	21.0	12.5	38.0						19.0	18.3	35.0					26.7
	s.d.	-	3.6	3.5	-	-	-	-	-	-	10.8	5.8	13.2	-	-	-	-	12.9
	N	1	3	2	1						7	3	3					6
Obsidian	X		7.2		10.0			15.0	10.0		9.3	10.0	9.2		5.0			9.2
	s.d.	-	2.9	-	0.0	-	-	-	0.0	-	3.1	0.0	2.0	-	-	-	-	1.8
	N		4		2			1	2		9	5	6		1			12
Other lithic	X	10.0	10.0	20.2			6.8	10.3	8.5		10.5	11.3	12.3		11.7	15.0		12.1
	s.d.	-	u.0	20.9	-	-	1.6	0.6	0.7	-	9.4	4.1	4.0	-	2.9	6.5	-	4.3
	N	1	3	4			9	3	2		22	30	33		3	7		73
Indeterminate lithic	X								23.0		23.0		33.7					33.7
	s.d.	-	-	-	-	-	-	-	-	-	-	-	27.8	-	-	-	-	27.8
	N								1		1		4					4
Total	X	10.8	10.7	10.9	10.5	10.4	11.3	11.0	11.8	12.7	10.9	11.1	11.0	10.7	10.2	11.0	11.3	11.0
	s.d.	3.5	4.0	4.7	3.8	3.0	5.0	4.3	5.5	4.2	4.3	4.4	4.8	4.0	4.6	4.7	4.1	4.6
	N	1,026	1,411	2,941	783	174	253	493	197	32	7,310	1,506	3,580	231	413	356	88	6,174

Table B-9. Debitage by material and zone, 45-OK-250 and 45-OK-4.

Material/ Object Type	45-OK-250 Zone										45-OK-4 Zone						
	11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Cryptocrystalline																	
Conchoidal flake	1,663	2,211	4,668	1,314	321	452	794	346	56	11,825	2,658	6,653	296	798	571	131	11,107
Tabular flake	-	-	-	-					-			1	-	-	-	-	-
Chunk	177	234	540	111	40	45	84	52	7	1,290	140	310	8	52	27	8	545
Weathered	2	2	3	-	1	3	-	3		14	-		-	-	-	-	-
Quartzite																	
Conchoidal flake	11	25	51	8	6	6	9	2	1	119	8	17	3	5	6	2	41
Tabular flake	384	699	1,400	126	103	41	92	43	5	2,893	836	2,361	137	218	458	88	4,098
Chunk	16	35	65	10	5	4	12	8		155	51	98	5	22	24	3	203
Weathered	-	-	-	1	-	1	-	1		3					-	-	-
Fine-grained quartzite																	
Conchoidal flake	1	1	6	-		1				9	22	24	2	2	10	2	62
Tabular flake	-	-	1			-				1		2	-		-	-	2
Chunk	2	2	4	-		1	-	1		10	4	5	-	3	-	-	12
Weathered	-	-				-	1			1					-		-
Basalt																	
Conchoidal flake	15	28	50	16	8	6	8	5	3	139	312	744	240	41	150	14	1,501
Tabular flake	-	-	1	-				-	-	1					-	-	-
Chunk	4	5	6	1	1	-	-	-		17	2	9	1	2	3	-	17
Granitic																	
Conchoidal flake	1	3	4	1	-				-	9	8	6	-	-	-	-	14
Tabular flake	-	-	1	-					-	1	1	15		-	1	-	17
Chunk	3	-	1	-		1	-			5	-	-			4	-	4
Obsidian																	
Conchoidal flake	1	4	1	4	2	-	1	3	-	16	4	6	-	1	-	-	11
Chunk	1	-		-	-					1				-	-	-	-
Other lithic																	
Conchoidal flake	5	7	8	1	1	26	5	5		58	59	63	2	9	10	-	143
Tabular flake	-	-	-	-						-	-	10	-	1	1	-	12
Chunk	-	1	3	-	1	1	-	1		7	-	3	-	-	-	-	3
Weathered	1	-	-	-	-	-	1	-		2		-	-				-
Indeterminate/ missing	-	-	1	-				-		1	-	-	-	-	-	-	-
Indeterminate lithic																	
Conchoidal flake	-	-		-		-	-	1		1	1	4	-	-	-	-	5
Tabular flake	-	-	-	-		-	-			-	-	1	1	-	-	-	2
Chunk	1	-	1	-	-	2	1	-		5	-	-			-	-	-
Weathered	1	1	-	-	-			-	-	2	-			-	-	-	-
Indeterminate/ missing	-	-	2	3	4	-	-		-	9		1		-	-	-	1
Total	1,697	2,279	4,788	1,344	338	491	817	362	60	12,176	4,106	10,333	668	1,154	1,265	248	17,801

Table B-10. Count of condition by zone, 45-OK-250 and 45-OK-4.

Condition		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Complete	N	128	196	442	76	20	79	113	54	5	1,113	70	195	11	20	21	11	328
	%	5.2	5.6	6.1	4.5	3.8	12.4	10.1	10.5	6.5	6.3	1.6	1.8	1.5	1.6	1.6	4.1	1.8
Proximal fragment	N	30	63	128	20	6	69	67	31	12	426	4	4	-	1	-	-	9
	%	1.2	1.8	1.8	1.2	1.1	10.8	6.0	6.0	15.6	2.4	0.1	<0.1		0.1			<0.1
Proximal flake	N	5	8	22	5	2	12	11	7	1	73	-	-	-	-	-	-	-
	%	0.2	0.2	0.3	0.3	0.4	1.9	1.0	1.4	1.3	0.4							
Broken	N	499	886	1,736	180	133	131	186	102	16	3,869	155	315	24	48	43	9	594
	%	20.4	25.2	24.0	10.7	25.1	20.5	16.7	19.8	20.8	21.8	3.6	2.9	3.3	3.9	3.3	3.4	3.2
NA/indeterminate	N	5	3	6	5	5	5	10	6	1	46	1	3	-	1	-	-	5
	%	0.2	0.1	0.1	0.3	0.9	0.8	0.9	1.2	1.3	0.3	<0.1	<0.1		0.1			<0.1
ABX-complete	N	951	1,299	2,678	767	158	188	418	159	26	6,644	1,486	3,557	231	409	351	86	6,120
	%	38.8	36.9	37.0	45.6	29.8	29.5	37.5	30.8	33.8	37.4	34.4	32.9	31.8	33.6	26.6	32.1	32.8
ABX-broken	N	669	833	1,748	534	160	118	237	105	11	4,415	1,574	3,932	309	444	392	63	6,714
	%	27.3	23.7	24.1	31.7	30.2	18.5	21.3	20.3	14.3	24.8	36.5	36.4	42.6	36.5	29.7	23.5	36.0
ABX-X	N	163	231	487	96	46	36	72	52	5	1,188	1,025	2,792	151	295	513	99	4,875
	%	6.7	6.6	6.7	5.7	8.7	5.6	6.5	10.1	6.5	6.7	23.8	25.9	20.8	24.2	38.9	36.9	26.1
Total	N	2,450	3,519	7,247	1,683	530	638	1,114	516	77	17,774	4,315	10,798	726	1,218	1,320	268	18,645

Table B-11. Count of treatment category by zone, 45-OK-250 and 45-OK-4.

Treatment		45--250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
None	N	2,441	3,497	7,200	1,677	530	630	1,107	512	68	17,662	4,315	10,795	726	1,218	1,319	268	18,641
	%	99.6	99.4	99.4	99.6	100.0	98.7	99.4	99.2	88.3	99.4	100.0	100.0	100.0	100.0	99.9	100.0	100.0
Burned	N	8	21	39	6	-	7	7	3	1	92	-	3	-	-	1	-	4
	%	0.3	0.6	0.5	0.4		1.1	0.6	0.6	1.3	0.5		<0.1			0.1		<0.1
Dehydrated	N	1	1	8	-	-	1	-	1	8	20	-	-	-	-	-	-	-
	%	<0.1	<0.1	0.1			0.2		0.2	10.4	0.1		<0.1			0.1		<0.1
Total	N	2,450	3,519	7,247	1,683	530	638	1,114	516	77	17,774	4,315	10,798	726	1,218	1,320	268	18,645

Table B-12. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

None
Wear only
Manufacture only
Manufacture and wear
Modified/indeterminate
Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

None
Chipping
Pecking
Grinding
Chipping and pecking
Chipping and grinding
Pecking and grinding
Chipping, pecking, grinding
Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

None
Partial
Total
Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

None
Complete
Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

None
Independent
Overlapping - total
Overlapping - partial
Independent - opposite
Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

Abrasion/grinding
Smoothing
Crushing/pecking
Polishing

DIMENSION VI: Continued

Feathered chipping
Feathered chipping/abrasion
Feathered chipping/smoothing
Feathered chipping/crushing
Feathered chipping/polishing
Hinged chipping
Hinged chipping/abrasion
Hinged chipping/smoothing
Hinged chipping/crushing
Hinged chipping/polishing
None

DIMENSION VII: LOCATION OF WEAR

Edge only
Unifacial edge
Bifacial edge
Point only
Point and unifacial edge
Point and bifacial edge
Point and any combination
Surface
Terminal surface
None

DIMENSION VIII: SHAPE OF WORN AREA

Not applicable
Convex
Concave
Straight
Point
Notch
Slightly convex
Slightly concave
Irregular

DIMENSION IX: ORIENTATION OF WEAR

Not applicable
Parallel
Oblique
Perpendicular
Diffuse
Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

Actual edge angle

Table B-13. Combinations of functional variables.

1. Kind of wear

   Smoothing: The following were included in the smoothing category on the premise that they result from similar sorts of activities. In the case of the feathered and hinged chipping, smoothing is the final result of use.
      a. Feathered chipping and smoothing
      b. Hinged chipping and smoothing

2. Location of wear

   Point:
      a. Point only
      b. Point, unifacial
      c. Point and 2 edges

   Surface:
      a. Surface
      b. Terminal surface

3. Shape of worn area

   Convex:
      a. Convex
      b. Mildly convex

   Concave:
      a. Concave
      b. Mildly concave

Table B-14. Utilization/modification by zone, 45-OK-250 and 45-OK-4.

Utilization/ Modification		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
None	N	2,291	3,260	6,819	1,597	493	577	995	458	70	16,560	4,108	10,351	697	1,156	1,261	248	17,821
	%	93.5	92.6	94.1	94.9	93.0	90.4	89.3	88.8	90.9	93.2	95.2	95.9	96.0	94.9	95.5	92.5	95.6
Wear only	N	50	68	152	34	11	21	43	15	2	396	57	107	6	13	12	4	199
	%	2.0	1.9	2.1	2.0	2.1	3.3	3.9	2.9	2.6	2.2	1.3	1.0	0.8	1.1	0.9	1.5	1.1
Manufacture only	N	59	90	127	32	17	19	43	20	4	411	78	163	9	24	23	10	307
	%	2.4	2.6	1.8	1.9	3.2	3.0	3.9	3.9	5.2	2.3	1.8	1.5	1.2	2.0	1.7	3.7	1.6
Wear and manufacture	N	45	81	120	19	8	17	31	14	1	336	62	147	10	23	21	4	267
	%	1.8	2.3	1.7	1.1	1.5	2.7	2.8	2.7	1.3	1.9	1.4	1.4	1.4	1.9	1.6	1.5	1.4
Modified/ indeterminate	N	5	19	28	1	1	4	1	9	-	68	10	28	4	1	2	2	47
	%	0.2	0.5	0.4	0.1	0.2	0.6	0.1	1.7		0.4	0.2	0.3	0.6	0.1	0.2	0.7	0.3
Indeterminate	N	-	1	1	-	-	-	1	-	-	3	-	2	-	1	1	-	4
	%		<0.1	<0.1				0.1			<0.1		<0.1		0.1	0.1		<0.1
Total	N	2,450	3,519	7,247	1,683	530	638	1,114	516	77	17,774	4,315	10,798	726	1,218	1,320	268	18,645

Table B-15. Count of type of manufacture by zone, 45-OK-250 and 45-OK-4.

Type of Manufacture		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
None	N	2,341	3,328	6,971	1,631	504	598	1,038	473	72	16,956	4,165	10,458	703	1,169	1,273	252	18,020
	%	95.6	94.6	96.2	96.9	95.1	93.7	93.2	91.7	93.5	95.4	96.5	96.9	96.8	96.0	96.4	94.0	96.6
Chipping	N	103	171	247	51	25	36	74	34	5	746	140	310	19	47	44	14	574
	%	4.2	4.9	3.4	3.0	4.7	5.6	6.6	6.6	6.5	4.2	3.2	2.9	2.6	3.9	3.3	5.2	3.1
Chipping and grinding	N	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%	<0.1									<0.1							
NA/indeterminate	N	5	20	29	1	1	4	2	9	-	71	10	30	4	2	3	2	51
	%	0.2	0.6	0.4	0.1	0.2	0.6	0.2	1.7		0.4	0.2	0.3	0.6	0.2	0.2	0.7	0.3
Total	N	2,450	3,519	7,247	1,683	530	638	1,114	516	77	17,774	4,315	10,798	726	1,218	1,320	268	18,645

Table B-16. Count of manufacturing disposition by zone, 45-OK-250 and 45-OK-4.

Manufacturing disposition		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
None	N	2,341	3,328	6,971	1,631	504	598	1,038	473	72	16,956	4,165	10,458	703	1,169	1,273	252	18,020
	%	95.6	94.6	96.2	96.9	95.1	93.7	93.2	91.7	93.5	95.4	96.5	96.9	96.8	96.0	96.4	94.0	96.6
Partial	N	96	165	236	48	25	34	67	30	4	705	106	250	17	37	34	10	454
	%	3.9	4.7	3.3	2.9	4.7	5.3	6.0	5.8	5.2	4.0	2.5	2.3	2.3	3.0	2.6	3.7	2.4
Total	N	8	6	11	3	-	2	7	4	1	42	34	60	2	10	10	4	120
	%	0..3	0.2	0.2	0.2		0.3	0.6	0.8	1.3	0.2	0.8	0.6	0.3	0.8	0.8	1.5	0.6
NA/indeterminate	N	5	20	29	1	1	4	2	9	-	71	10	30	4	2	3	2	51
	%	0.2	0.6	0.4	0.1	0.2	0.6	0.2	1.7		0.4	0.2	0.3	0.6	0.2	0.2	0.7	0.3
Total	N	2,450	3,519	7,247	1,683	530	638	1,114	516	77	17,774	4,315	10,798	726	1,218	1,320	268	18,645

Table B-17. Wear/manufacture relationship by zone, 45-OK-250 and 45-OK-4.

Wear/manufacture Relationship		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
None	N	66	88	209	49	13	31	62	19	4	541	93	178	7	25	23	5	331
	%	50.8	40.6	57.9	57.0	54.2	52.5	56.4	41.3	57.1	52.0	48.4	46.0	30.4	39.7	44.2	45.5	45.5
Independent	N	3	6	7	8	-	2	4	-	-	30	20	16	2	5	1	-	44
	%	2.3	2.8	1.9	9.3		3.4	3.6			2.9	10.4	4.1	8.7	7.9	1.9		6.0
Total overlap	N	57	111	135	26	8	19	42	27	3	428	77	186	14	33	28	6	344
	%	43.8	51.2	37.4	30.2	33.3	32.2	38.2	58.7	42.9	41.2	40.1	48.1	60.9	52.4	53.8	54.5	47.3
Partial overlap	N	3	7	6	-	2	1	2	-	-	21	2	6	-	-	-	-	8
	%	2.3	3.2	1.7		8.3	1.7	1.8			2.0	1.0	1.6					1.1
Indeterminate/ opposing	N	1	5	3	3	1	6	-	-	-	19	-	1	-	-	-	-	1
	%	0.8	2.3	0.8	3.5	4.2	10.2				1.8		0.3					0.1
NA/indeterminate	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			0.3							0.1							
Total	N	130	217	361	86	24	59	110	46	7	1,040	192	387	23	63	52	11	728

Table B-18. Kind of wear by zone, 45-OK-250 and 45-OK-4.

Kind of Wear		45-OK-250 Zone										45-OK-4 Zone						
		11	12	13	14	15	21	22	23	24	Total	31	32	33	41	42	43	Total
Abrasion/ grinding	N	6	9	4	-	1	-	1	1	-	22	11	12	3	1	-	-	27
	%	4.6	4.1	1.1		4.2		0.9	2.2		2.1	5.7	3.1	13.0	1.6			3.7
Smoothing	N	29	60	83	6	3	5	12	3	3	204	45	129	4	15	23	5	221
	%	22.3	27.6	23.0	7.0	12.5	8.5	10.9	6.5	42.9	19.6	23.4	33.3	17.4	23.8	44.2	45.5	30.4
Crushing/pecking	N	6	20	45	6	2	1	12	3	-	95	15	72	1	7	7	2	104
	%	4.6	9.2	12.5	7.0	8.3	1.7	10.9	6.5		9.1	7.8	18.6	4.3	11.1	13.5	18.2	14.3
Polishing	N	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%		0.5								0.1							
Feathered chipping	N	64	85	157	52	10	38	54	22	4	486	70	98	9	18	14	3	212
	%	49.2	39.2	43.5	60.5	41.7	64.4	49.1	47.8	57.1	46.7	36.5	25.3	39.1	28.6	26.9	27.3	29.1
Feathered chipping/abrasion	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			0.3							0.1							
Feathered chipping/smoothing	N	1	9	8	8	1	1	1	-	-	28	3	2	-	-	1	-	6
	%	0.8	4.1	2.2	9.3	4.2	1.7	0.9										
Feathered chipping/crushing	N	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-
	%			0.3							0.1							
Hinged chipping	N	19	30	48	11	7	14	22	16	-	167	48	69	5	20	7	1	150
	%	14.6	13.8	13.3	12.8	29.2	23.7	20.0	34.8		16.1	25.0	17.8	21.7	31.7	13.5	9.1	20.6
Hinged chipping/ abrasion	N	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
	%												0.3					0.1
Hinged chipping/ smoothing	N	5	2	12	3	-	-	8	1	-	31	-	3	1	2	-	-	6
	%	3.8	0.9	3.3	3.5			7.3	2.2		3.0			4.3	3.2			0.8
Hinged chipping/ crushing	N	-	1	2	-	-	-	-	-	-	3	-	1	-	-	-	-	1
	%		0.5	0.6							0.3		0.3					0.1
Total	N	130	217	361	86	24	59	110	46	7	1,040	192	387	23	63	52	11	728

Table B-19. Cobble tool classification.

DIMENSION I: OBJECT TYPE

- Utilized flake
- Unifacially retouched flake
- Bifacially retouched flake
- Resharpening flake
- Utilized spall
- Core
- Anvil
- Biface
- Chopper
- Edge ground cobble
- Hammerstone
- Hopper mortar base
- Maul
- Millingstone
- Mortar
- Net weight
- Peripherally flaked cobble
- Pestle
- Tabular knife
- Indeterminate

DIMENSION II: MATERIAL

- Basalt
- Quartzite
- Granitic
- Porphrytic
- Other

DIMENSION III: SIZE

- Length - mm
- Width - mm
- Thickness - mm

DIMENSION IV: TOOL AREAS [1-9]

DIMENSION V: WEAR AREAS [1-9]

DIMENSION VI: MANUFACTURE

- Flaked surface
- Flaked edge/margin
- Flaked end
- Pecked surface
- Pecked edge/margin
- Pecked end
- Ground surface
- Ground edge/margin
- Ground end
- None
- Indeterminate

DIMENSION VII: DIAGNOSTIC OF MANUFACTURE

- Unifacial edge
- Bifacial edge
- Facet
- Beveled facet
- Convex surface
- Flat surface
- Concave surface
- Point
- Notch
- Girdle
- Well
- None
- Other

DIMENSION VIII: WEAR LOCATION-NO MANUFACTURE

- Surface
- Edge [natural or flaked]
- End
- Margin
- Not applicable

DIMENSION IX: WEAR

- Polishing
- Smoothing
- Battering
- Crushing
- Abrasion
- Grinding
- Flaking
- None
- Indeterminate

DIMENSION X: WEAR LOCATION-MANUFACTURE

- Proximal edge
- Distal edge
- Lateral edge
- Adjacent edge
- Separate
- Whole facet
- Partial facet
- Not applicable/Indeterminate

DIMENSION XI: WEAR LOCATION-COBBLE

- Cortex
- Interior
- Interface
- Not applicable/Indeterminate

Table B-20. Morphological projectile point classification dimensions.

DIMENSION I: BLADE-STEM JUNCTURE

N. Not separate
1. Side-notched
2. Shouldered
3. Squared
4. Barbed
9. Indeterminate

DIMENSION II: OUTLINE

N. Not applicable
1. Triangular
2. Lanceolate
9. Indeterminate

DIMENSION III: STEM EDGE ORIENTATION

N. Not applicable
1. Straight
2. Contracting
3. Expanding
9. Indeterminate

DIMENSION IV: SIZE

N. Not applicable
1. Large
2. Small

DIMENSION V: BASAL EDGE SHAPE

N. Not applicable
1. Straight
2. Convex
3. Concave
4. Point
5. 1 or 2 and notched
9. Indeterminate

DIMENSION VI: BLADE EDGE SHAPE

N. Not applicable
1. Straight
2. Excurvate
3. Incurvate
4. Reworked
9. Indeterminate

DIMENSION VII: CROSS SECTION

N. Not applicable
1. Planoconvex
2. Biconvex
3. Diamond
4. Trapezoidal
9. Indeterminate

DIMENSION VIII: SERRATION

N. Not applicable
1. Not serrated
2. Serrated
9. Indeterminate

DIMENSION IX: EDGE GRINDING

N. Not applicable
1. Not ground
2. Blade edge
3. Stem edge
9. Indeterminate

DIMENSION X: BASAL EDGE THINNING

N. Not applicable
1. Not thinned
2. Short flake scars
3. Long flake scars
9. Indeterminate

DIMENSION XI: FLAKE SCAR PATTERN

N. Not applicable
1. Variable
2. Uniform
3. Mixed
4. Collateral
5. Transverse
6. Other
9. Indeterminate

Table B-21. Individual projectile point data, 45-OK-250 and 45-OK-4.

Historic[1] Type	Morphological Type	Complete Morphological Class	Master Number	Zone
45-OK-250				
21	5	N2NN1221121	760	12
21	5	N2NN1241123	450	22
21	5	N2NN4211121	1799	12
21	5	N2NN4242121	1404	11
23	5	N2NN2131131	3	0
31	6	22NN1231121	1048	13
31	6	22NN2241131	1201	12
31	6	22NN9221193	103	0
41	3	1NN13929NN9	319	22
42	4	1NN21121NN1	100	0
42	4	1NN21929NN1	92	0
42	4	1NN23942NN1	95	0
51	10	21129111NN3	782	13
51	7	21211111NN1	1021	13
51	7	21211141NN1	1036	13
51	7	21211141NN1	812	11
51	7	21211211NN1	735	12
51	7	21211221NN1	4010	0
51	7	21211221NN3	927	14
51	7	21212132NN1	1223	13
51	7	21212141NN1	338	22
51	7	21212142NN1	1211	12
51	7	21212142NN1	921	12
51	7	21212221NN1	327	23
51	7	21212241NN3	936	13
51	7	21212929NN1	840	11
51	7	21219241NN1	351	23
51	8	21221132NN1	1808	12
51	8	21221321NN1	4008	0
51	8	21222142NN1	1236	14
51	8	21223141NN1	802	11
51	8	21224112NN1	721	13
51	8	21224211NN1	1556	14
51	8	21224221NN1	632	12
51	9	21313241NN1	156	22
51	9	21313241NN1	794	11
51	11	31211241NN1	1058	11
51	11	31211331NN1	4014	0
51	11	31212121NN1	1283	15
51	11	31212922NN9	337	24
51	12	31222121NN1	1620	13
52	7	21211221NN1	1750	11
52	7	21211929NN9	575	11
52	7	21212221NN1	1329	12
52	7	21212221NN1	106	0
52	8	21221321NN1	1582	13
52	8	21222121NN1	4009	0
52	13	31112222NN3	1375	13
52	11	31212121NN3	923	13
52	11	31212122NN1	318	22
52	11	31212132NN3	573	13
52	11	31212212NN1	1807	12
52	11	31212949NN9	328	23
52	11	31219221NN1	2	0
52	12	31221122NN1	448	22
52	12	31221142NN1	1472	11
52	12	31221211NN1	971	12
52	12	31222122NN1	1532	13
52	12	31222212NN1	1708	13
52	12	31222242NN1	1852	13
52	12	31224211NN1	1074	11
52	12	31229142NN1	1684	13
52	18	41122121NN1	891	12

Table B-21. Cont'd.

Historic1 Type	Morphological Type	Complete Morphological Class	Master Number	Zone
52	15	41211322NN3	223	21
52	15	41219141NN1	347	22
52	16	41229222NN1	1235	14
53	7	21211141NN3	1557	13
53	7	21214122NN1	1549	13
53	7	21214331NN1	1490	13
53	8	21221322NN1	1022	15
53	8	21222141NN1	1318	13
53	8	21222142NN1	40	0
53	8	21222212NN1	1528	13
53	8	21222222NN1	1471	12
53	8	21222232NN1	1769	12
53	8	21223241NN1	1436	12
53	8	21224121NN1	1085	14
53	8	21224122NN3	884	13
53	8	21224132NN1	1779	13
53	8	21224132NN3	4011	0
53	8	21224142NN1	861	13
53	8	21224221NN1	1731	13
53	8	21224241NN1	1212	13
53	8	21224341NN1	968	11
53	8	21229922NN1	239	22
53	11	31212321NN1	1914	0
53	11	31212321NN3	431	22
53	11	31212322NN4	1242	12
53	11	31214332NN3	1247	14
53	12	31221141NN1	35	0
53	12	31222122NN1	713	13
53	12	31222321NN1	4013	0
53	12	31224112NN1	1858	13
53	12	31224142NN1	1227	14
53	12	31224221NN1	1552	13
53	12	31224222NN3	1083	12
53	12	31224242NN1	1613	13
53	12	31224321NN1	1826	13
61	9	21312929NN8	459	13
61	13	31312121NN1	4	0
61	13	31313321NN1	460	12
61	13	31319121NN3	151	22
61	14	31321121NN1	330	23
61	14	31321929NN1	189	22
61	18	41122242NN1	529	14
61	18	41329121NN3	342	23
62	13	31311221NN1	1	0
62	13	31312221NN1	518	12
62	13	31313321NN1	1007	11
62	13	31313929NN1	1910	0
62	13	31313929NN1	205	21
63	14	31123212NN1	903	11
63	12	31229121NN1	1026	13
71	17	41119929NN1	1178	11
72	17	41312121NN1	159	21
74	15	41212321NN3	4012	0
99	2	N1N22111NN1	1324	11
99	6	22NN1241111	1051	12

Table B-21. Cont'd.

Historic1 Type	Morphological Type	Complete Morphological Class	Master Number	Zone
45-OK-4				
21	6	22NN2222NN1	711	43
22	5	N2NN3212121	1025	31
22	5	N2NN3241123	402	43
23	5	N2NN2231121	889	32
23	6	22NN2221121	727	42
31	6	22NN1221121	719	41
31	6	22NN1221121	224	31
31	6	22NN2121121	549	32
31	6	22NN2221121	488	32
31	6	22NN2221123	101	32
31	6	22NN4221131	497	31
51	-	-	721	41
51	1	N1N12221NN1	0	0
51	5	N2NN4111121	442	31
51	7	21211121NN1	1030	32
51	7	21211221NN1	329	32
51	7	21211322NN1	860	31
51	7	21211929NN1	803	31
51	7	21212222NN1	118	31
51	7	21213241NN1	1022	32
51	7	21215221NN1	182	31
51	7	21219121NN3	742	41
51	7	21219321NN1	615	31
51	8	21221111NN1	320	33
51	8	21221142NN1	804	32
51	8	21221241NN1	254	32
51	8	21222121NN1	89	32
51	8	21222121NN1	521	31
51	8	21222132NN1	759	32
51	8	21222211NN1	945	31
51	8	21222242NN1	119	31
51	8	21223142NN1	36	0
51	8	21229112NN1	588	31
51	8	21229222NN1	747	41
51	10	21325221NN1	353	32
51	11	31211122NN3	429	31
51	11	31211221NN1	532	32
51	11	31212222NN1	962	32
51	12	31221211NN1	635	32
51	12	31229142NN1	874	32
51	13	31312222NN3	649	42
51	14	31321111NN1	135	32
52	7	21211131NN1	208	31
52	7	21211221NN1	605	32
52	7	21219121NN1	1026	32
52	8	21221241NN1	886	32
52	13	31113222NN1	453	32
52	14	31121229NN9	40	0
52	11	31212121NN1	190	32
52	11	31212121NN1	540	32
52	11	31212122NN1	801	31
52	11	31212221NN3	34	0
52	11	31212321NN1	589	32
52	11	31219121NN1	406	41
52	12	31221111NN1	450	32
52	12	31222121NN1	802	31
52	12	31222121NN1	787	32
52	12	31222221NN1	673	42
52	12	31223342NN1	713	42
52	13	31311321NN1	651	41
52	18	41122341NN3	800	32
53	7	21212111NN1	449	32
53	8	21222142NN1	299	33

Table B-21. Cont'd.

Historic Type	Morphological Type	Complete Morphological Class	Master Number	Zone
53	8	21222241NN1	840	31
53	8	21222321NN1	693	43
53	8	21223322NN1	336	32
53	8	21224221NN1	861	31
53	8	21229121NN1	606	32
53	11	31211141NN1	952	31
53	11	31212929NN1	242	32
53	11	31214332NN1	235	31
53	11	31219122NN3	798	32
52	12	31222122NN1	881	32
53	12	31222122NN3	426	43
53	12	31222321NN1	912	31
53	12	31222342NN3	173	32
53	12	31224121NN1	183	32
53	12	31224142NN1	335	32
53	12	31224322NN1	330	32
53	12	31224332NN3	585	32
53	12	31229321NN1	481	32
53	12	31229322NN1	553	31
53	12	31229922NN9	312	32
53	14	31322122NN1	347	32
61	13	31112121NN1	502	31
61	13	31311121NN3	10	0
61	13	31311221NN1	716	42
61	13	31313321NN3	937	31
61	13	31319241NN1	384	42
62	13	31312929NN9	773	31
62	13	31312949NN1	222	31
62	17	41311221NN1	668	41
63	13	31312222NN3	503	31
63	14	31321121NN1	1	0
63	14	31321929NN9	4	0
63	14	31322122NN1	771	31
63	14	31323121NN1	704	43
63	18	41322321NN1	204	31
64	–	–	634	32
64	8	21222212NN1	741	42
64	8	21229242NN1	816	32
64	18	41321929NN9	14	0
71	3	1NN15929NN1	6	0
73	16	41224222NN3	926	31
74	18	41329322NN1	56	0
81	1	N1N13231NN1	729	43
81	2	N1N22121NN1	706	41
91	–	–	1047	32
99	1	N1N12311NN1	377	41
99	7	21211941NN1	485	31

[1] For key to historic type name, see Figure B-1.

HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side notched	52 RABBIT ISLAND A	62 QUILOMENE Corner notched	72 QUILOMENE B Basal notched
		14 WINDUST B		53 RABBIT ISLAND B		
	21 CASCADE A	31 MAHKIN SHOULDERED			63 COLUMBIA B Corner notched	73 COLUMBIA STEM A
	22 CASCADE B					74 COLUMBIA STEM B
	23 CASCADE C				64 WALLULA Rectangular stemmed	75 COLUMBIA STEM C

Types are numbered consecutively within formal series a two digit code indicates the approximate temporal sequence of defined series and types

Type names are those most commonly applied Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area

Figure B-1. Historical projectile point types.

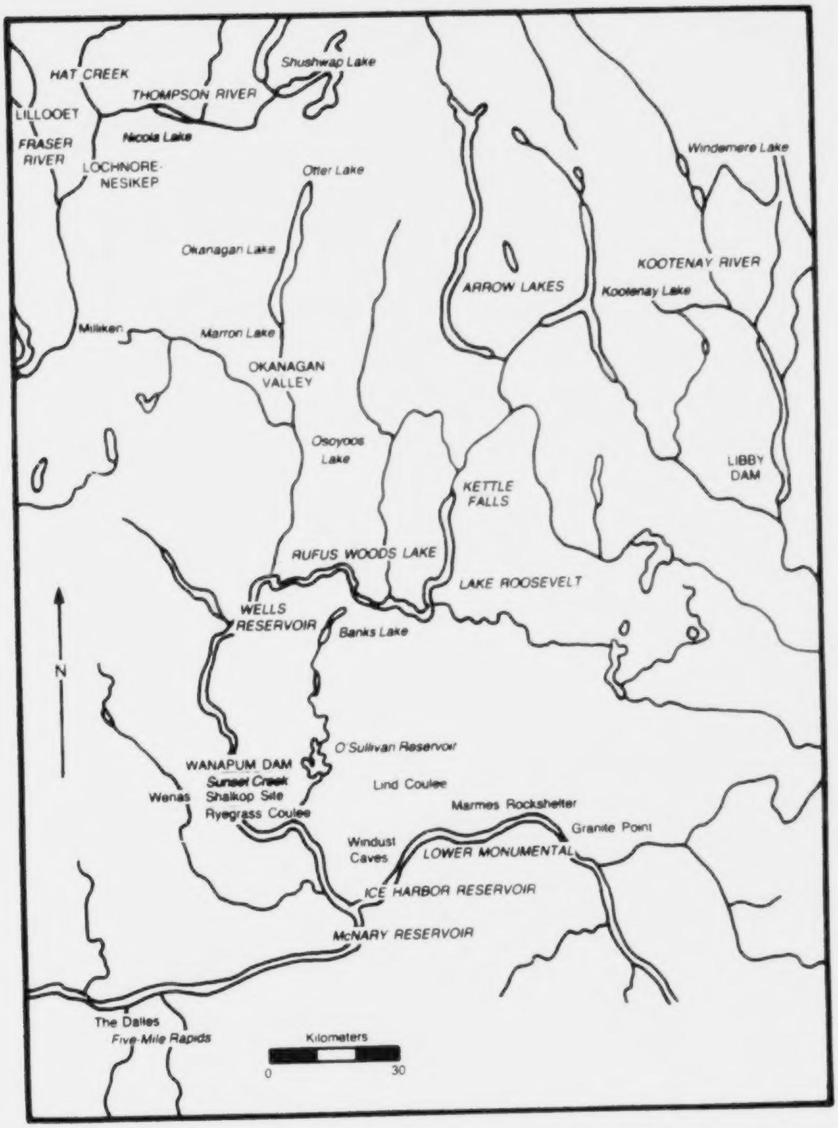
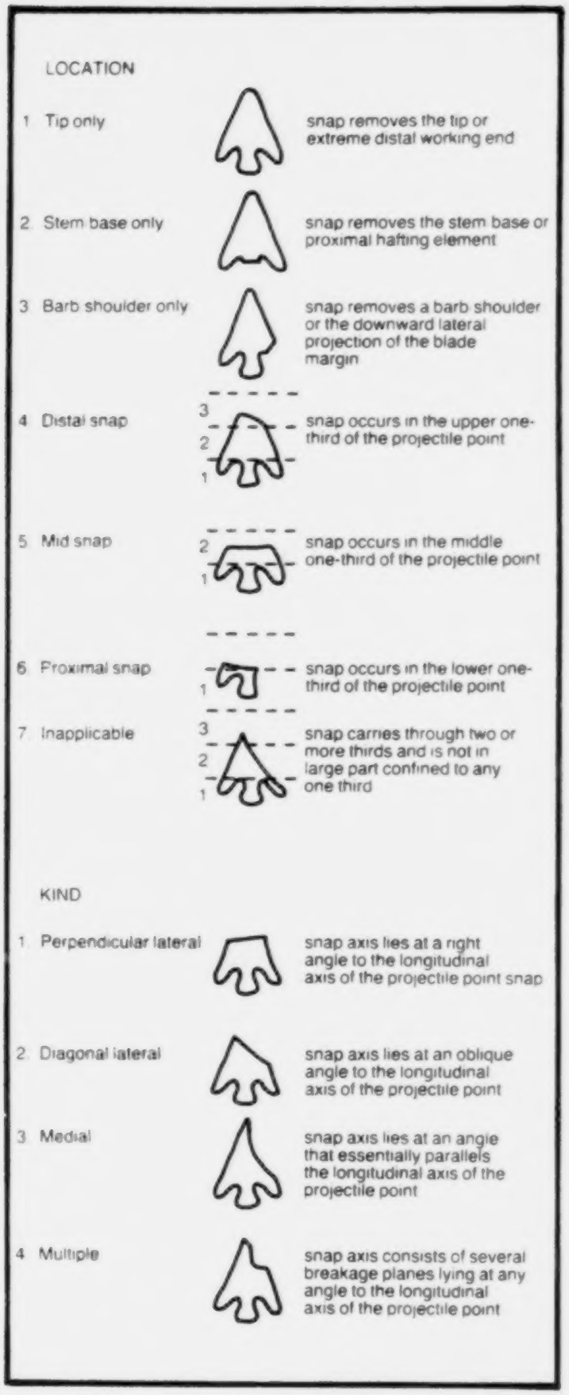

HAT CREEK
THOMPSON RIVER
Shushwap Lake
LILLOOET
Nicola Lake
FRASER RIVER
LOCHNORE-NESIKEP
Otter Lake
Windemere Lake
Okanagan Lake
KOOTENAY RIVER
ARROW LAKES
Kootenay Lake
Milliken
Marron Lake
OKANAGAN VALLEY
Osoyoos Lake
LIBBY DAM
KETTLE FALLS
RUFUS WOODS LAKE
LAKE ROOSEVELT
WELLS RESERVOIR
Banks Lake
N
O'Sullivan Reservoir
WANAPUM DAM
Sunset Creek
Shalkop Site
Ryegrass Coulee
Wenas
Lind Coulee
Marmes Rockshelter
Granite Point
Windust Caves
LOWER MONUMENTAL
ICE HARBOR RESERVOIR
McNARY RESERVOIR
The Dalles
Five-Mile Rapids
Kilometers
0
30

Figure B-2. Location of projectile point assemblages analyzed.



LOCATION

1 Tip only	snap removes the tip or extreme distal working end
2 Stem base only	snap removes the stem base or proximal hafting element
3 Barb shoulder only	snap removes a barb shoulder or the downward lateral projection of the blade margin
4 Distal snap	snap occurs in the upper one-third of the projectile point
5 Mid snap	snap occurs in the middle one-third of the projectile point
6 Proximal snap	snap occurs in the lower one-third of the projectile point
7 Inapplicable	snap carries through two or more thirds and is not in large part confined to any one third

KIND

1 Perpendicular lateral	snap axis lies at a right angle to the longitudinal axis of the projectile point snap
2 Diagonal lateral	snap axis lies at an oblique angle to the longitudinal axis of the projectile point
3 Medial	snap axis lies at an angle that essentially parallels the longitudinal axis of the projectile point
4 Multiple	snap axis consists of several breakage planes lying at any angle to the longitudinal axis of the projectile point

Figure B-3. Projectile point breakage terminology.

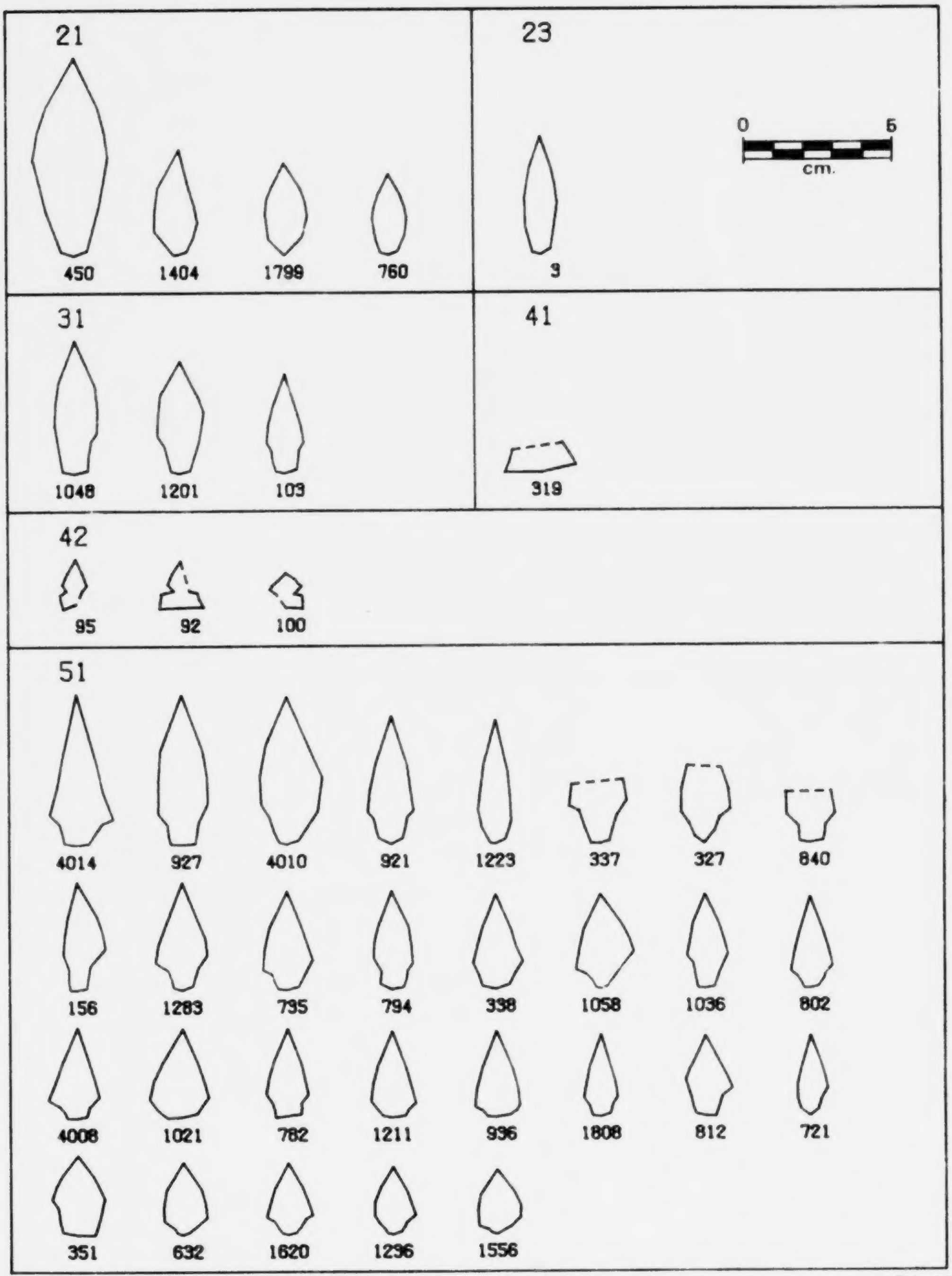

21
450
1404
1799
760
23
3
0
5
cm.
31
1048
1201
103
41
319
42
95
92
100
51
4014
927
4010
921
1223
337
327
840
156
1283
735
794
338
1058
1036
802
4008
1021
782
1211
936
1808
812
721
351
632
1620
1296
1556

Figure B-4. Projectile point outlines from digitized measurements, 45-OK-250. Upper number is the historic type (see Figure B-1 for key). Lower number is the master number.

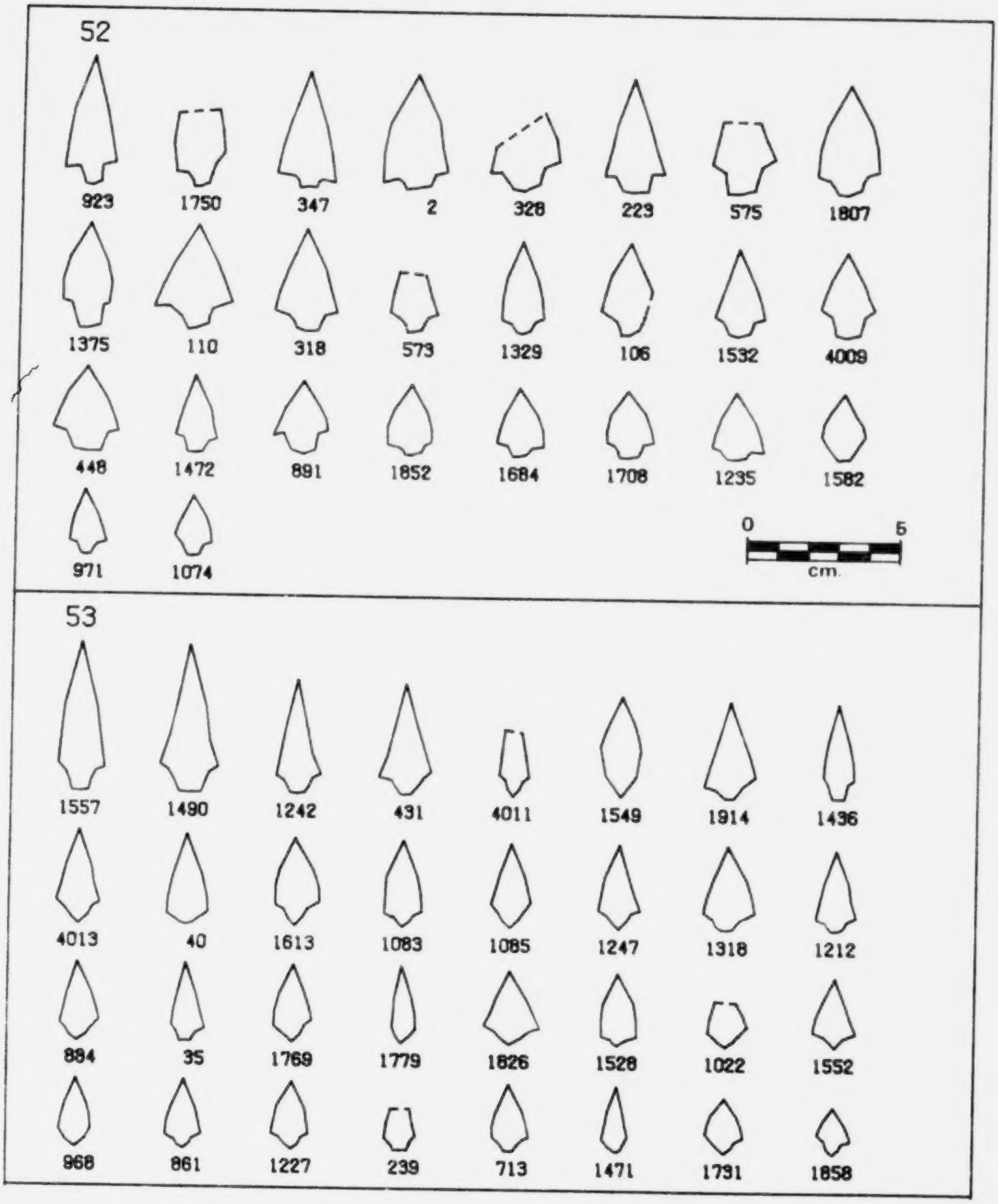

52
923
1750
347
2
328
223
575
1807
1375
110
318
573
1329
106
1532
4009
448
1472
891
1852
1684
1708
1235
1582
971
1074
0
5
cm.
53
1557
1490
1242
431
4011
1549
1914
1436
4013
40
1613
1083
1085
1247
1318
1212
884
35
1769
1779
1826
1528
1022
1552
968
861
1227
239
713
1471
1791
1858

Figure B-4. Cont'd.

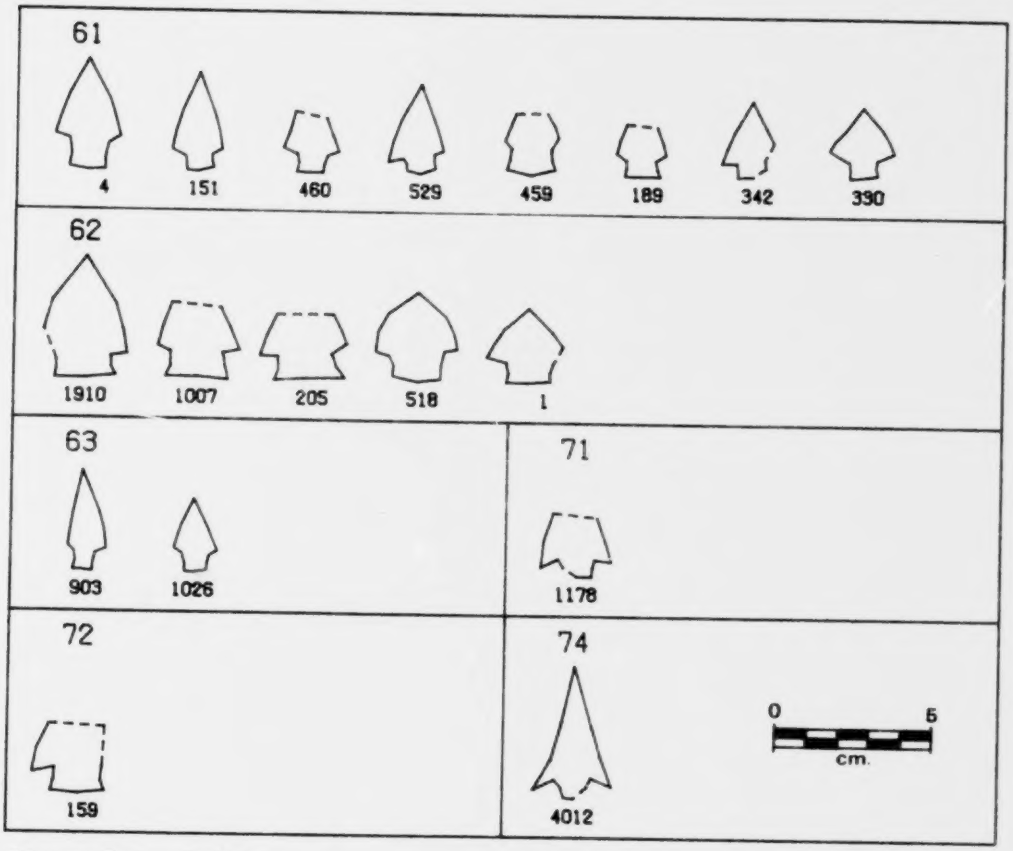

61
4
151
460
529
459
189
342
330
62
1910
1007
205
518
1
63
903
1026
71
1178
72
159
74
4012
0
5
cm.

Figure B-4. Cont'd.

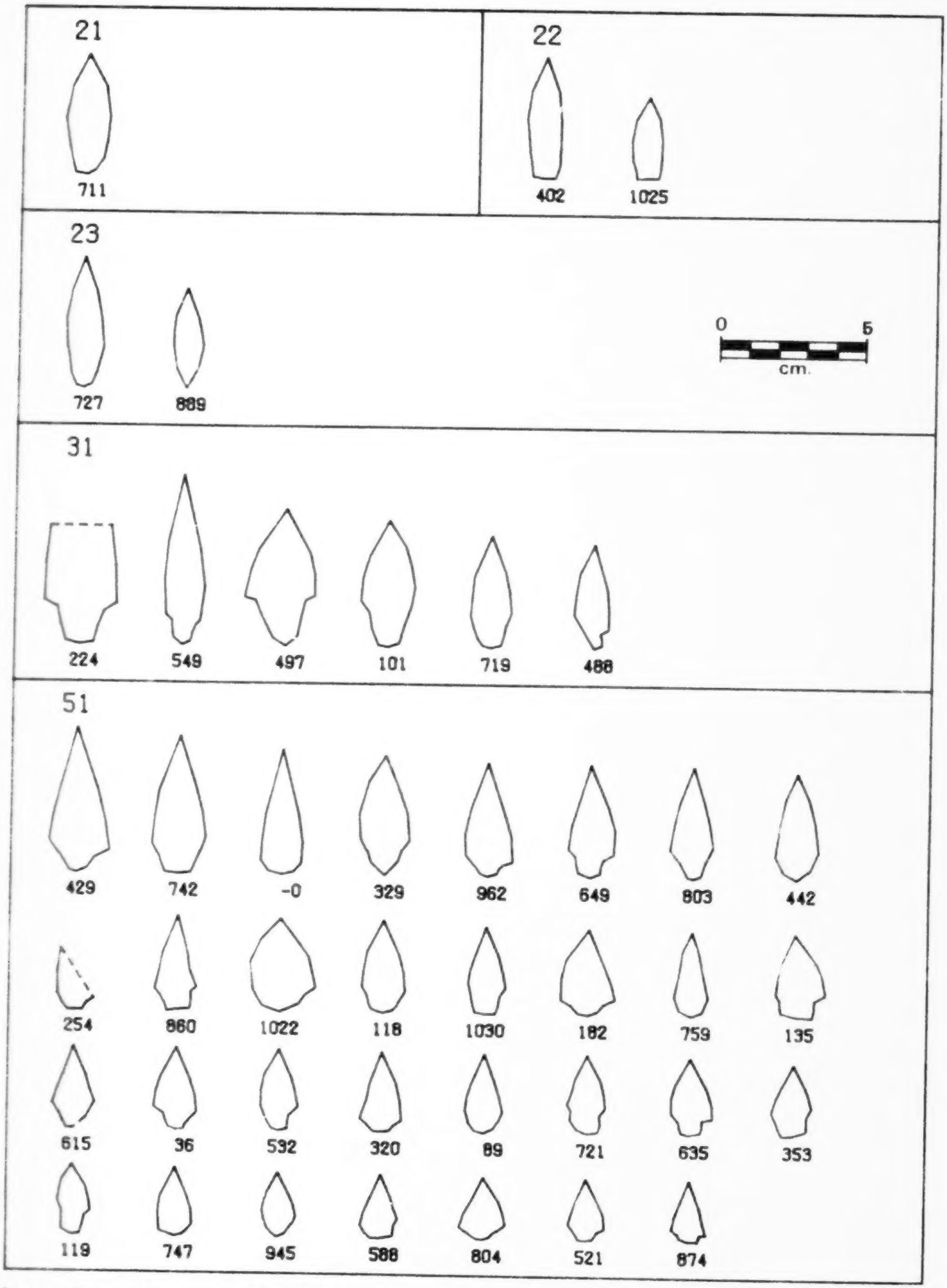

21
711
22
402
1025
23
727
889
0
5
cm
31
224
549
497
101
719
488
51
429
742
-0
329
962
649
803
442
254
860
1022
118
1030
182
759
135
615
36
532
320
89
721
635
353
119
747
945
588
804
521
874

Figure B-5. Projectile point outlines from digitized measurements, 45-OK-4. Upper number is the historic type (see Figure B-1 for key). Lower number is the master number.

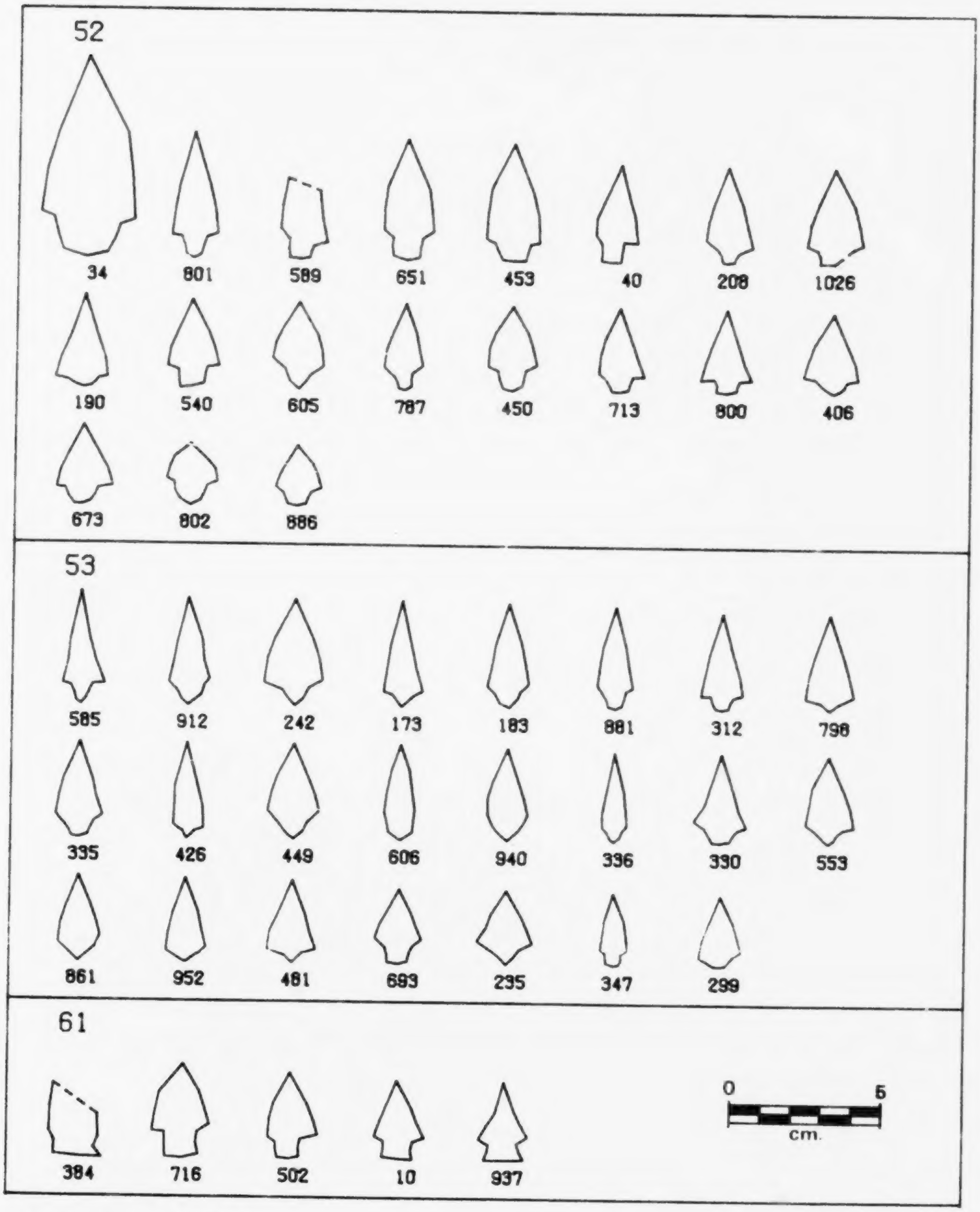

52
34
801
589
651
453
40
208
1026
190
540
605
787
450
713
800
406
673
802
886
53
585
912
242
173
183
881
312
798
335
426
449
606
940
336
330
553
861
952
481
693
235
347
299
61
384
716
502
10
937
0
5
cm.

Figure B-5. Cont'd.

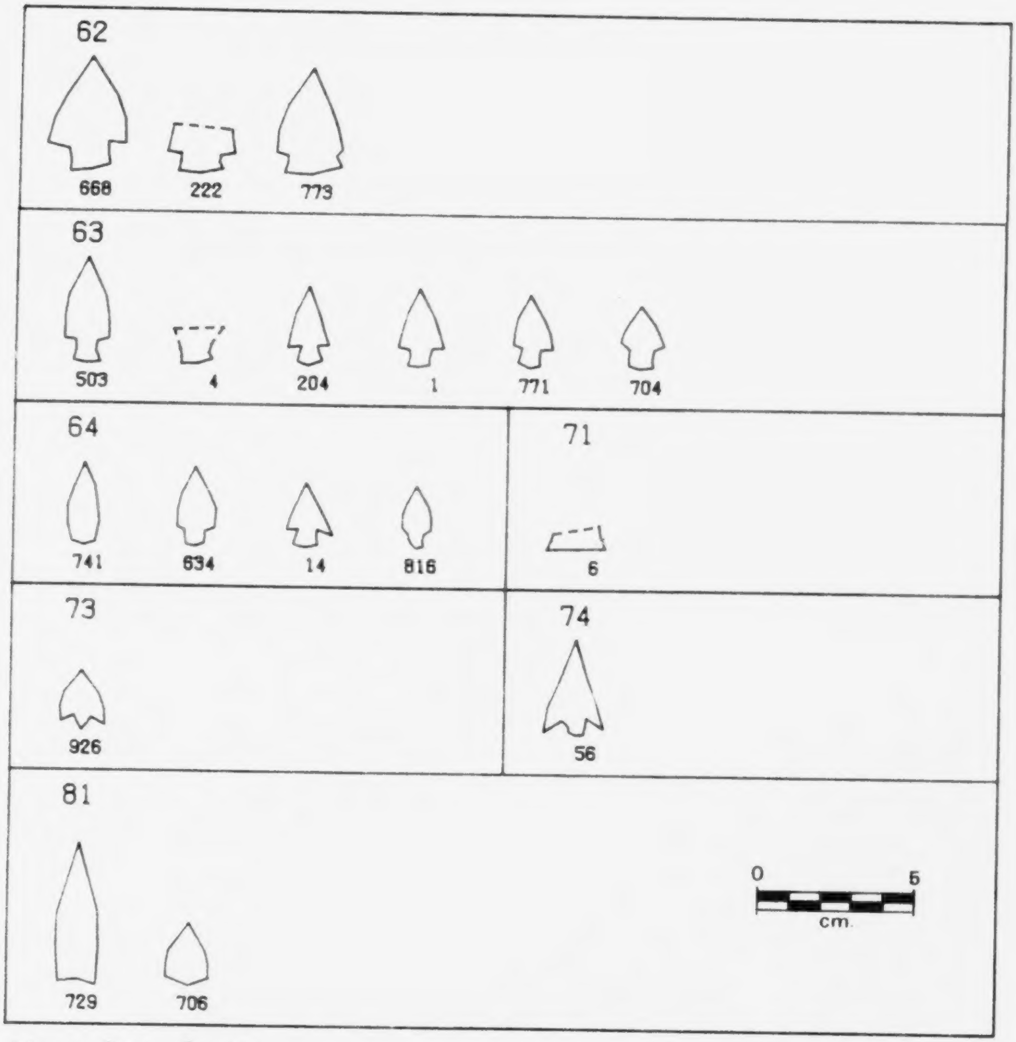

62
668
222
773
63
503
4
204
1
771
704
64
741
634
14
816
71
6
73
926
74
56
81
729
706
0
5
cm

Figure B-5. Cont'd.

APPENDIX C:

FAUNAL ASSEMBLAGE

Identified faunal elements are listed here by the finest site zones. To correlate these zones with Zones 51, 52, and 53, as used in Table 4-1, see Figure 2-16.

45-OK-250

Family Soricidae

Sorex spp.

Area 2

Zone 23: 1 skull fragment.

Family Leporidae

Sylvilagus cf. *nuttallii*

Area 1

Zone 13: 1 humerus fragment.

Family Sciuridae

Spermophilus spp.

Area 1

Zone 13: 1 femur fragment.

Zone 14: 1 humerus fragment.

Zone 15: 1 mandible fragment, 1 humerus fragment.

Marmota flaviventris

Area 1

Zone 12: 1 incisor fragment.

Zone 13: 1 incisor, 1 molar, 1 tibia fragment.

Zone 15: 2 mandible fragments.

Area 2

Zone 23: 1 scapula fragment.

Zone 24: 1 skull fragment.

Family Geomyidae

Thomomys talpoides

Area 1

Zone 12: 1 skull fragment, 3 mandibles, 2 mandible fragments, 2 humeri, 2 innominate fragments, 1 femur, 3 femur fragments.

Zone 13: 5 mandibles, 6 mandible fragments, 1 scapula fragment, 1 humerus, 1 ulna fragment, 1 tibia.

Zone 14: 2 skull, 2 mandibles, 4 mandible fragments, 1 humerus, 3 humerus fragments, 1 ulna fragment, 1 innominate fragment, 1 femur, 1 femur fragment.

Zone 15: 1 skull, 7 skull fragments, 6 mandibles, 4 mandible fragments, 2 scapulae, 4 scapula fragments, 7 humeri, 2 humerus fragments, 3 ulnae, 3 radii, 2 pelvi, 3 innominate fragments, 6 femora, 2 femur fragments, 8 tibia, 1 tibia fragment.

Area 2

Zone 21: 1 femur fragment.

Zone 22: 2 skull fragments, 3 mandibles, 2 mandible fragments, 3 scapulae, 2 humeri, 1 ulna, 1 radius, 3 innominates, 1 innominate fragment, 1 sacrum, 3 femora, 2 femur fragments, 1 tibia.

Zone 23: 3 skull fragments, 1 mandible, 1 mandible fragment, 2 humerus fragments, 1 ulna, 2 innominate fragments, 1 femur, 3 femur fragments, 2 tibia fragments.

Zone 24: 1 mandible.

Family Heteromyidae

Perognathus parvus

Area 1

Zone 11: 1 mandible.

Zone 12: 2 skull fragments, 5 mandibles, 4 mandible fragments, 2 femora, 1 tibia.

Zone 13: 5 skull fragments, 2 mandibles, 8 mandible fragments, 1 femur fragment.

Zone 14: 2 skull fragments, 2 mandibles, 3 mandible fragments.

Zone 15: 1 skull, 3 mandibles.

Area 2

Zone 21: 1 skull fragment, 2 mandible fragments.

Zone 22: 1 skull, 1 skull fragment, 2 mandibles, 1 mandible fragment.

Zone 23: 2 skulls, 3 skull fragments, 4 mandibles, 1 mandible fragment, 1 innominate, 1 sacrum, 1 femur, 2 femur fragments, 3 tibae.

Zone 24: 1 mandible fragment.

Family Cricetidae

Area 1

Zone 12: 1 mandible fragment.

Zone 13: 2 skull fragments.

Zone 14: 1 skull fragment, 1 femur fragment.

Zone 15: 3 mandible fragments.

Peromyscus maniculatus

Area 1

Zone 11: 1 mandible fragment.

Zone 12: 1 mandible, 1 mandible fragment.

Zone 13: 2 skull fragments, 3 mandibles, 2 mandible fragments, 1 scapula, 1 humerus fragment, 1 innominate, 1 femur fragment, 1 tibia fragment.

Zone 15: 1 skull fragment.

Area 2

Zone 23: 2 mandibles, 1 scapula.

Microtus spp.

Area 1

Zone 12: 1 mandible fragment.

Zone 14: 1 mandible.

Zone 15: 2 mandible fragments.

Family Castoridae

Castor canadensis

Area 1

Zone 12: 1 incisor fragment.

Family Canidae

Area 1

Zone 15: 1 caudal vertebra.

Canis spp.

Area 1

Zone 11: 1 molariform tooth fragment.

Zone 12: 1 astragalus, 1 phalanx.

Zone 13: 1 incisor, 1 canine tooth, 2 axis vertebra fragments, 4 lumbar vertebrae, 1 sacrum, 3 caudal vertebrae, 1 rib, 1 rib fragment, 1 carpal, 2 innominates, 1 innominate fragment, 1 femur, 1 femur fragment, 1 patella, 1 metapodial, 2 metapodial fragments, 1 phalanx, 1 phalanx fragment.

Zone 14: 1 mandible fragment, 1 canine, 1 premolar, 1 metapodial, 1 phalanx.

Zone 15: 1 mandible fragment, 1 phalanx.

Area 2

Zone 23: 1 skull fragment.

Family Cervidae

Area 1

Zone 13: 5 antler fragments.

Zone 14: 3 antler fragments.

Zone 15: 1 antler fragment.

Odocoileus spp.

Area 1

Zone 11: 28 molariform tooth fragments, 1 innominate fragment, 1 metapodial fragment, 1 phalanx fragment.

Zone 12: 2 skull fragments, 6 mandible fragments, 7 incisors, 1 incisor fragment, 11 premolars, 8 premolar fragments, 7 molars, 47 molar fragments, 1 scapula fragment, 1 radius fragment, 4 carpals, 1 metacarpal fragment, 2 astragali, 2 astragalus fragments, 1 calcaneus fragment, 1 metatarsal fragment, 6 metapodial fragments, 5 phalanx fragments.

Zone 13: 3 antler fragments, 13 skull fragments, 27 mandible fragments, 24 incisors, 5 incisor fragments, 49 premolars, 27 premolar fragments, 44 molars, 155 molar fragments, 1 scapula, 6 scapula fragments, 1 radius fragment, 5 carpals, 2 metacarpal fragments, 3 astragali, 2 astragalus fragments, 3 tarsals, 1 tarsal fragment, 6 metatarsal fragments.

Zone 14: 1 skull fragment, 1 mandible fragment, 2 incisors, 2 premolars, 2 molars, 26 molariform tooth fragments, 1 ulna fragment, 1 radius fragment, 1 innominate fragment, 1 tibia fragment, 1 astragalus fragment, 1 metatarsal fragment, 2 metapodial fragments, 1 phalanx.

Zone 15: 4 skull fragments, 2 mandible fragments, 10 incisors, 14 premolars, 1 premolar fragment, 8 molars, 29 molar fragments, 2 humerus fragments, 1 radius fragment, 1 ulna fragment, 1 carpal, 5 metacarpal fragments, 2 innominate fragments, 5 tibia fragments, 2 astragali, 4 calcanea, 3 tarsals, 6 metatarsal fragments, 1 phalanx, 3 phalanx fragments.

Area 2

Zone 21: 3 molariform tooth fragments.

Zone 22: 24 molariform tooth fragments, 2 metacarpal fragments, 2 innominate fragments, 2 metatarsal fragments, 1 metapodial fragment, 1 phalanx fragment.

Zone 23: 2 mandible fragments, 2 premolars, 2 molars, 6 molariform tooth frgments, 1 scapula, 1 radius fragment, 1 metacarpal fragment, 1 innominate fragment, 1 phalanx fragment.

Cervus elaphus

Area 1

Zone 13: 1 scapula fragment.

Family Bovidae

Area 1

Zone 11: 2 incisor fragments.

Zone 12: 1 incisor fragment, 5 molariform tooth fragments.

Zone 13: 1 incisor, 2 incisor fragments, 7 molariform tooth fragments.

Zone 14: 1 molariform tooth fragment.

Area 2

Zone 22: 1 incisor fragment, 1 molariform tooth fragment.

Zone 24: 1 molariform tooth fragment.

Ovis canadensis

Area 1

Zone 11: 1 phalanx fragment.

Zone 12: 1 mandible fragment, 1 incisor fragment, 2 premolars, 1 premolar fragment, 4 molars, 1 vertebra fragment.

Zone 13: 2 premolar fragments, 1 molar, 1 molar fragment, 2 metapodial fragments.

Zone 14: 1 premolar fragment, 1 metapodial fragment.

Zone 15: 2 mandible fragments, 1 incisor fragment, 2 premolars, 5 molars, 2 molariform tooth fragments, 1 humerus fragment, 2 ulna fragments, 4 radius fragments, 5 carpals, 1 metacapral fragment, 1 calcaneus fragment, 2 metatarsal fragments, 3 metapodial fragments, 1 sesamoid.

Area 2

Zone 22: 2 molars.

Zone 23: 3 horn core fragments, 1 molariform tooth fragment.

Deer-Sized

Area 1

Zone 11: 1 skull fragment, 2 mandible fragments, 1 cervical vertebra fragment, 3 rib fragments, 1 humerus fragment, 2 ulna fragments, 1 radius fragment, 1 metacarpal fragment, 1 astragalus fragment, 1 calcaneus fragment, 1 metatarsal fragment, 1 metapodial fragment, 1 phalanx fragment, 1 dewclaw fragment, 1 sesamoid.

Zone 12: 6 skull fragments, 13 mandible fragments, 3 cervical vertebra fragments, 4 thoracic vertebra fragments, 17 lumbar vertebra fragments, 55 rib fragments, 4 scapular fragments, 13 humerus fragments, 8 radius fragments, 3 ulna fragments, 3 carpals, 2 carpal fragments, 6 metacarpal fragments, 4 innominate fragments, 4 femur fragments, 8 tibia fragments, 5 astragalus fragments, 3 calcaneus fragments, 8 metatarsal fragments, 4 metapodial fragments, 4 phalanx fragments.

Zone 13: 11 skull fragments, 22 mandible fragments, 2 hyoid fragments, 1 atlas fragment, 5 axis fragments, 22 cervical vertebra fragments, 1 thoracic vertebra, 4 thoracic vertebra fragments, 29 lumbar vertebra fragments, 1 centrum fragment, 138 rib fragments, 2 costal cartilage fragments, 20 scapula fragments, 31 humerus fragments, 23 radius fragments, 9 ulna fragments, 2 carpals, 2 carpal fragments, 13 metacarpal fragments, 9 innominate fragments, 24 femur fragments, 39 tibia fragments, 19 astragalus fragments, 8 calcaneus fragments, 2 tarsal fragments, 66 metatarsal fragments, 24 metapodial fragments, 19 phalanx fragments, 4 dewclaw fragments, 2 sesamoids.

Zone 14: 1 skull fragment, 6 mandible fragments, 1 hyoid fragment, 1 cervical vertebra fragment, 7 lumbar vertebra fragments, 1 centrum fragment, 20 rib fragments, 1 sternabra, 5 costal cartilage fragments, 1 scapula fragment, 1 humerus fragment, 5 radius fragments, 2 ulna fragments, 2 metacarpal fragments, 1 innominate fragment, 8 femur fragments, 3 tibia fragments, 3 astragalus fragments, 1 calcaneus fragment, 10 metatarsal fragments, 7 metapodial fragments, 3 phalanx fragments.

Zone 15: 2 skull fragments, 3 mandible fragments, 2 hyoid fragments, 4 cervical vertebra fragments, 2 thoracic vertebra fragments, 5 lumbar vertebra fragments, 1 centrum fragment, 12 rib fragments 2 costal cartilage fragments, 3 scapula fragments, 5 radius fragments, 1 carpal, 3 metacarpal fragments, 3 innominate fragments, 3 femur fragments, 6 tibia fragments, 8 calcaneus fragments, 1 tarsal fragment, 6 metatarsal fragments, 1 metapodial fragment, 5 phalanx fragments, 1 patella, 1 dewclaw fragment.

Area 2

Zone 21: 1 mandible fragment, 3 lumbar vertebra fragments, 1 radius fragment, 1 femur fragment, 2 astragalus fragments, 1 phalanx fragment.

Zone 22: 2 skull fragment 2 mandible fragments, 1 hyoid fragment, 1 cervical vertebra fragment, 1 lumbar vertebra fragment, 6 rib fragments, 1 scapula fragment, 1 humerus fragment, 1 metacarpal fragment, 4 innominate fragments, 1 femur fragment, 2 tibia fragments, 6 metatarsal fragments, 2 metapodial fragments, 3 phalanx fragments.

Zone 23: 1 skull fragment, 1 mandible fragment, 2 lumbar vertebra fragment, 4 rib fragments, 3 humerus fragments, 1 radius fragment, 3 ulna fragments, 2 carpal fragments, 1 metacarpal fragment, 1 innominate fragment, 1 tibia fragment, 1 astragalus fragment, 1 metatarsal fragment, 2 phalanx fragments.

Zone 24: 1 sternabra fragment, 1 ulna fragment, 1 tibia fragment, 1 metapodial fragment.

Elk-Sized

Area 1

Zone 12: 2 cervical vertebra fragments.

Area 2

Zone 23: 1 cervical vertebra fragment.

Family Chelydridae

Chrysemys picta

Area 1

Zone 11: 13 shell fragments.

Zone 12: 69 shell fragments.

Zone 13: 89 shell fragments.

Zone 14: 19 shell fragments.

Zone 15: 11 shell fragments.

Area 2

Zone 21: 6 shell fragments.

Zone 22: 8 shell fragments.

Family Colubridae

Area 1

Zone 11: 2 vertebrae.

Zone 12: 1 vertebra.

Zone 13: 51 vertebrae, 2 vertebra fragments.

Zone 14: 17 vertebrae, 2 vertebra fragments.

Zone 15: 55 vertebrae.

Family Viperidae

Crotalus

Area 1

Zone 12: 1 vertebra.

Zone 13: 1 vertebra.

Family Ranidae/Bufonidae

Area 1

Zone 13: 1 skull fragment.

Family Salmonidae

Area 1

Zone 12: 6 vertebra fragments.

Zone 13: 5 vertebrae, 23 vertebra fragments.

Zone 14: 9 vertebra fragments.

Zone 15: 1 vertebra, 3 vertebra fragments.

Area 2

Zone 21: 1 vertebra fragment.

Zone 22: 4 vertebrae, 31 vertebra fragments.

Zone 23: 39 vertebrae, 48 vertebra fragments.

Zone 24: 6 vertebra fragments.

Onchorynchus tshwaytscha

Area 1

Zone 11: 1 vertebra fragment.

Family Cyprinidae

Area 1

Zone 13: 5 vertebrae.

Zone 14: 1 vertebra fragment.

Area 2

Zone 13: 3 vertebrae, 1 vertebra fragment.

45-OK-4

Family Leporidae

Area 3

Zone 32: 1 tibia fragment.

Family Sciuridae

Spermophilus spp.

Area 3

Zone 32: 1 humerus fragment.

Marmota flaviventris

Area 3

Zone 31: 1 skull fragment, 1 mandible fragment, 1 astragalus.

Zone 32: 1 incisor, 2 molars, 1 mandible fragment, 1 tibia fragment, 1 astragalus, 1 phalanx.

Area 4

Zone 42: 1 femur fragment.

Zone 43: 1 ulna fragment.

Family Geomyidae

Thomomys talpoides

Area 3

Zone 32: 6 skull fragments, 1 mandible, 17 mandible fragments, 4 scapula fragments, 6 humerus fragments, 1 ulna, 1 radius, 1 pelvis, 2 innominates, 6 innominate fragments, 1 sacrum, 5 femurs, 3 femur fragments, 3 tibae.

Zone 33: 1 skull, 2 skull fragment, 2 mandibles, 6 mandible fragments, 1 scapula, 2 scapula fragments, 1 humerus, 3 humerus fragments, 1 ulna, 1 ulna fragment, 1 innominate fragment, 1 femur, 2 femur fragments, 2 tibias.

Area 4

Zone 41: 1 molar, 1 humerus fragment, 1 ulna fragment, 2 femur fragments.

Zone 42: 3 skull fragments, 1 mandible, 4 mandible fragments, 2 humeri, 2 humerus fragments, 1 innominate fragment, 1 femur fragment, 1 tibia.

Zone 43: 1 mandible, 1 mandible fragment, 7 vertebrae, 1 humerus fragment, 1 radius, 2 innominate fragments, 1 sacrum, 2 femora, 1 femur fragment, 1 tibia.

Family Heteromydiae

Perognathus parvus

Area 3

Zone 31: 3 skull fragments, 2 mandibles, 5 mandible fragments.

Zone 32: 6 skull fragments, 5 mandibles, 16 mandible fragments, 1 innominate fragment.

Zone 33: 1 skull fragment, 1 mandible fragment.

Area 4

Zone 41: 2 mandible fragments.

Zone 42: 6 mandible fragments.

Zone 43: 1 skull, 1 skull fragment, 2 mandibles, 2 mandible fragments, 2 humerii, 1 innominate, 1 sacrum, 1 tibia.

Family Castoridae

Castor canadensis

Area 4

Zone 42: 1 incisor fragment.

Family Cricetidae

Area 3

Zone 31: 1 mandible fragment.

Zone 32: 1 skull fragment, 1 humerus.

Area 4

Zone 41: 1 humerus fragment.

Zone 43: 1 femur fragment.

Peromyscus maniculatus

Area 3

Zone 31: 2 mandible fragments.

Zone 32: 1 skull fragment, 1 mandible, 3 mandible fragments.

Area 4

Zone 41: 1 humerus fragment.

Zone 42: 2 mandibles.

Microtus spp.

Area 3

Zone 32: 1 skull fragment, 5 mandible fragments.

Lagurus curtatus

Area 3

Zone 32: 1 mandible fragment.

Family Canidae

Canis spp.

Area 3

Zone 32: 1 tarsal, 3 phalanges.

Zone 33: 1 phalanx.

Family Mustelidae

Mustela frenata

Area 4

Zone 41: 1 mandible fragment, 2 molariform teeth.

Mephitis mephitis

Area 3

Zone 32: 1 skull fragment, 1 canine tooth.

Family Cervidae

Area 3

Zone 32: 1 antler fragment.

Area 4

Zone 42: 3 antler fragments.

Odocoileus spp.

Area 3

Zone 31: 2 incisors, 2 incisor fragments, 2 molariform teeth, 30 molariform tooth fragments, 1 innominate fragment.

Zone 32: 25 skull fragments, 33 mandible fragments, 58 incisors, 6 incisor fragments, 83 premolars, 11 premolar fragments, 60 molars, 189 molar fragments, 1 scapula, 4 scapula fragments, 1 radius fragment, 1 ulna fragment, 1 metacarpal fragment, 9 innominate fragments, 5 astragali, 1 astragalus fragment, 1 calcaneus, 2 calcaneus fragments, 5 metatarsal fragments, 7 metapodial fragments, 4 phalanx fragments.

Zone 33: 2 skull fragments, 1 mandible fragment, 1 incisor fragment, 4 premolars, 4 molars, 13 molariform tooth fragments, 1 tibia fragment.

Area 4

Zone 41: 1 incisor fragment, 19 molariform tooth fragments, 1 carpal, 1 tarsal, 2 phalanx fragments.

Zone 42: 2 antler fragments, 5 mandible fragments, 1 incisor, 3 incisor fragments, 7 premolars, 8 premolar fragments, 2 molars, 142 molariform tooth fragments, 1 carpal, 1 metacarpal fragment, 1 tarsal fragment, 2 metatarsal fragments, 1 metapodial fragment, 1 phalanx fragment.

Zone 43: 3 skull fragments, 3 mandible fragments, 4 molars, 16 molariform tooth fragments, 2 radius fragments, 1 metacarpal fragment, 1 innominate fragment, 1 astragalus, 1 metapodial fragment.

Cervus elaphus

Area 3

Zone 32: 1 carpal.

Zone 33: 1 incisor.

Area 4

Zone 42: 1 astragalus, 1 phalanx fragment.

Bovidae

Antilocapra americana

Area 3

Zone 32: 1 radius fragment, 1 carpal, 1 metacarpal fragment.

Ovis canadensis

Area 3

Zone 31: 1 mandible fragment, 2 molars, 2 molar fragments, 1 astragalus, 1 metapodial fragment.

Zone 32: 5 horn core fragments, 2 skull fragments, 6 mandible fragments, 2 incisors, 7 premolars, 10 molars, 12 molariform tooth fragments, 5 astragali, 1 metapodial fragments, 2 phalanx fragments.

Zone 33: 2 horn core fragments, 1 mandible fragment, 3 premolars, 3 molars, 2 scapula fragments, 1 metacarpal fragment.

Area 4

Zone 41: 1 mandible fragment, 2 molars.

Zone 42: 1 scapula fragment, 1 metapodial fragment.

Zone 43: 1 premolar.

Deer-Sized

Area 3

Zone 31: 4 mandible fragments, 1 thoracic vertebra fragment, 2 lumbar vertebra fragments.

Zone 32: 14 skull fragment, 29 mandible fragments, 4 hyoid fragments, 4 atlas fragments, 20 cervical vertebra fragments, 15 thoracic vertebra fragments, 35 lumbar vertebra fragments, 2 sacrum fragments, 190 rib fragments, 1 sternum fragment, 10 scapula fragments, 47 humerus fragments, 45 radius fragments, 27 ulna fragments, 3 carpals, 6 carpal fragments, 55 metacarpal fragments, 19 innominate fragments, 32 femur fragments, 62 tibia fragments, 3 fibulas, 23 astragalus fragments, 6 calcaneus fragments, 3 tarsals, 80 metatarsal fragments, 12 dewclaw fragments, 27 metapodial fragments, 28 phalanx fragments.

Zone 33: 2 lumbar vertebra fragments, 2 rib fragments, 3 scapula fragments, 2 radius fragments, 3 metacarpal fragments, 1 patella fragment, 1 fibula, 1 astragalus fragment, 3 phalanx fragments, 1 sesamoid.

Area 4

Zone 41: 1 mandible fragment, 1 lumbar vertebra fragment, 1 rib fragment, 1 scapula fragment, 1 femur fragment, 1 astragalus fragment, 2 metatarsal fragments.

Zone 42: 1 skull fragment, 3 mandible fragments, 2 atlas fragments, 2 axis fragments, 2 cervical vertebra fragments, 2 lumbar vertebra fragments, 11 rib fragments, 4 scapula fragments, 9 humerus fragments, 9 radius fragments, 1 ulna fragment, 3 carpal fragments, 3 metacarpal fragments, 5 femur fragments, 5 tibia fragments, 6 astragalus fragments, 3 calcaneus fragments, 2 tarsal fragments, 13 metatarsal fragments, 7 metapodial fragments, 4 phalanx fragments, 1 sesamoid.

Zone 43: 2 mandible fragments, 1 cervical vertebra fragment, 4 rib fragments, 1 humerus fragment, 4 radius fragments, 2 ulna fragments, 1 metacarpal fragment, 1 patella, 2 phalanx fragments.

Elk-Sized

Area 3

Zone 31: 1 phalanx fragment.

Zone 32: 1 cervical vertebra fragment, 1 metapodial fragment.

Family Chelydridae

Chrysemys picta

Area 3

Zone 31: 8 shell fragments.

Zone 32: 115 shell fragments.

Zone 33: 1 shell fragment.

Area 4

Zone 41: 1 shell fragment.

Zone 43: 2 shell fragments.

Family Colubridae

Area 3

Zone 32: 31 vertebrae.

Family Salmoridae

Area 3

Zone 31: 1 vertebrae, 20 vertebra fragments.

Zone 32: 103 vertebrae, 427 vertebra fragments.

Zone 33: 3 vertebrae, 23 vertebra fragments.

Area 4

Zone 42: 2 vertebra fragments.

Zone 43: 1 vertebra fragment.

Family Cyprinidae

Area 3

Zone 31: 2 vertebrae, 1 vertebra fragment.

Zone 32: 18 vertebrae, 2 vertebra fragments.

Zone 33: 1 vertebra.

Area 4

Zone 42: 1 vertebra fragment.

Zone 43: 2 vertebra fragments.

Family Catostomidae

Area 3

Zone 32: 1 vertebra.

Table C-1. Taxonomic composition and distribution of vertebrate remains by area-zone, 45-OK-250.

Taxon	Area I Zones										Area II Zones									
	11		12		13		14		15		21		22		23		24		Total	
	NISP[1]	MNI[2]	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
MAMMALIA	56		334		1,647		171		295		16		89		86		8		2,122	
Soricidae																				
Sorex sp.		-	-		-		-		-		-				1	1	-	-	1	1
Leporidae																				
Sylvilagus nuttallii	-	-	-	-	1	1	-	-	-	-	-	-		-	-	-		-	1	1
Sciuridae																				
Marmota flaviventris	-	-	1	1	3	1	-		2	1	-	-			1	1	1	1	8	1
Spermophilus spp.			-	-	1	1	1	1	2	1							-	-	4	2
Geomyidae																				
Thomomys talpoides	-	-	14	3	15	5	16	3	61	6	1	1	25	3	16	1	1	1	149	17
Heteromyidae																				
Perognathus parvus	1	1	14	5	16	4	7	2	4	2	3	1	5	2	18	4	1	1	69	17
Castoridae																				
Castor canadensis	-	-	1	1													-		1	1
Cricetidae		-	1	-	2	-	2		3	1	3				-		-	-	8	-
Peromyscus maniculatus	1	1	2	1	13	3			1	1	-				3	2	-	-	19	6
Microtus spp.		-	1	1		-	1	1	2	1							-	-	4	2
Canidae	-	-	-		-		-		1	1	-	-				-		-	1	-
Canis spp.	1	1	2	1	26	2	5	1	2	1					1	1	-	-	37	1
Cervidae	-	-		-	5		3	-	1	-	-	-	-	-	-	-			9	-
Cervus elaphus		-	-	-	1	1					-	-			-			-	1	1
Odocoileus spp.	31	1	113	3	395	8	43	2	104	2	3	1	32	1	17	1			738	9
Bovidae	2	-	6	-	10	-	1				-	-	2	-	-	-	1	-	22	-
Ovis canadensis	1	1	10	1	6	1	2	1	32	2	-	-	2	2	4	1		-	57	3
Deer-Sized	19	-	177	-	554		90	-	80		9		33	-	24		4	-	990	-
Elk-Sized	-	-	2	-	-	-	-				-	-	-	-	1		-	-	3	-
REPTILIA																				
Chelydridae																				
Chrysemys picta	13	-	89	-	89		19		11	-	8	-	8	-	-			-	215	-
Colubridae	2	-	2	-	53		19	-	55		-							-	131	-
Viperidae																				
Crotalus viridus	-	-	1	-	1	-	1	-			-			-				-	3	-
AMPHIBIA																				
Ranidae/Bufonidae	-	-	-	-	1	-					-		-		-	-			1	-
PISCES																				
Salmonidae	-	-	6	-	28	-	9	-	4	-	1	-	35	-	87	-	6	-	176	-
Onchorynchus tshawytscha	-	-	-	-	-	-	1	-			-		-	-	-	-	-	-	1	-
Cyprinidae	-	-	-		5	-	1	-			-	-	-	-	4	-	-	-	10	-
Catostomidae	1	-	-	-	-	-								-	-		-	-	1	-
TOTAL	72		422		1,401		221		365		23		142		176		14		3,198	

[1] NISP = Number of Identified Specimens.
[2] MNI = Minimum Number of Individuals.

Table C-2. Taxonomic composition and distribution of vertebrate remains by area-zone, 45-OK-4.

Taxon	Area III Zones						Area IV Zones						Total	
	31		32		33		41		42		43			
	NISP[1]	MNI[2]	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI
MAMMALIA	115		1,540		95		64		308		82		2,203	
Leporidae														
Sylvilagus nuttallii	-	-	1	1	-	-	-		-	-	-	-	1	1
Sciuridae														
Marmota flaviventris	3	1	7	1	-	-	-		1	1	1	1	12	2
Spermophilus spp.	-	-	1	1	-	-	-		-	-	-	-	1	1
Geomyidae														
Thomomys talpoides	-	-	57	6	26	3	5	1	15	3	18	2	121	12
Heteromyidae														
Perognathus parvus	10	4	28	11	2	1	2	1	6	3	11	2	59	15
Castoridae														
Castor canadensis	-	-	-	-	-		-	-	1	1	-	-	1	1
Cricetidae	1	-	2		-	-	1	-	-		1	-	5	-
Peromyscus maniculatus	2	2	5	3	-	-	1	1	2	2	-	-	10	7
Microtus spp.			6	4	-	-	-		-	-	-	-	6	4
Lagurus curtatus	-	-	1	1	-	-	-	-	-	-	-	-	1	1
Mustelidae														
Mustela frenata	-	-	-	-	-	-	3	1	-	-	-	-	3	1
Mephitis mephitis	-	-	2	1	-		-		-	-	-	-	2	1
Canidae														
Canis spp.	-	-	4	1	1	1	-		-		-	-	5	1
Cervidae	-	-	1		-	-	-	-	3	-	-	-	4	-
Cervus elaphus	-	-	1	1	1	1	-	-	2	1	-	-	4	1
Odocoileus spp.	37	1	507	10	26	2	24	1	177	2	32	2	803	13
Antilocapridae														
Antilocapra americana	-		3	1	-	-	-		-		-	-	3	1
Bovidae	25	-	57	-	6	-	17	-	3		-	-	108	-
Ovis canadensis	7	1	52	3	12	1	3	1	2	1	1	1	77	4
Deer-Sized	29	-	802	-	19	-	8		98	-	18		974	-
Elk-Sized	1	-	2	-	-	-			-		-	-	3	-
REPTILIA	8		146		1		1		-		2		158	
Chelydridae														
Chrysemys picta	8	-	115	-	1	-	1	-	-	-	2	-	127	-
Colubridae	-	-	13		-					-	-	-	31	-
PISCES	24		551		27		-		3		3		608	
Salmonidae	21	-	530	-	26		-	-	2	-	1	-	580	-
Cyprinidae	3	-	20	-	1	-	-	-	1	-	2		27	-
Catostomidae	-	-	1	-	-	-	-	-	-	-	-	-	1	-
TOTAL	147		2,237		123		65		311		87		2,970	

[1] NISP = Number of Identified Specimens.
[2] MNI = Minimum Number of Individuals.

APPENDIX D:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

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